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AUTHOR Usoro, Hogan
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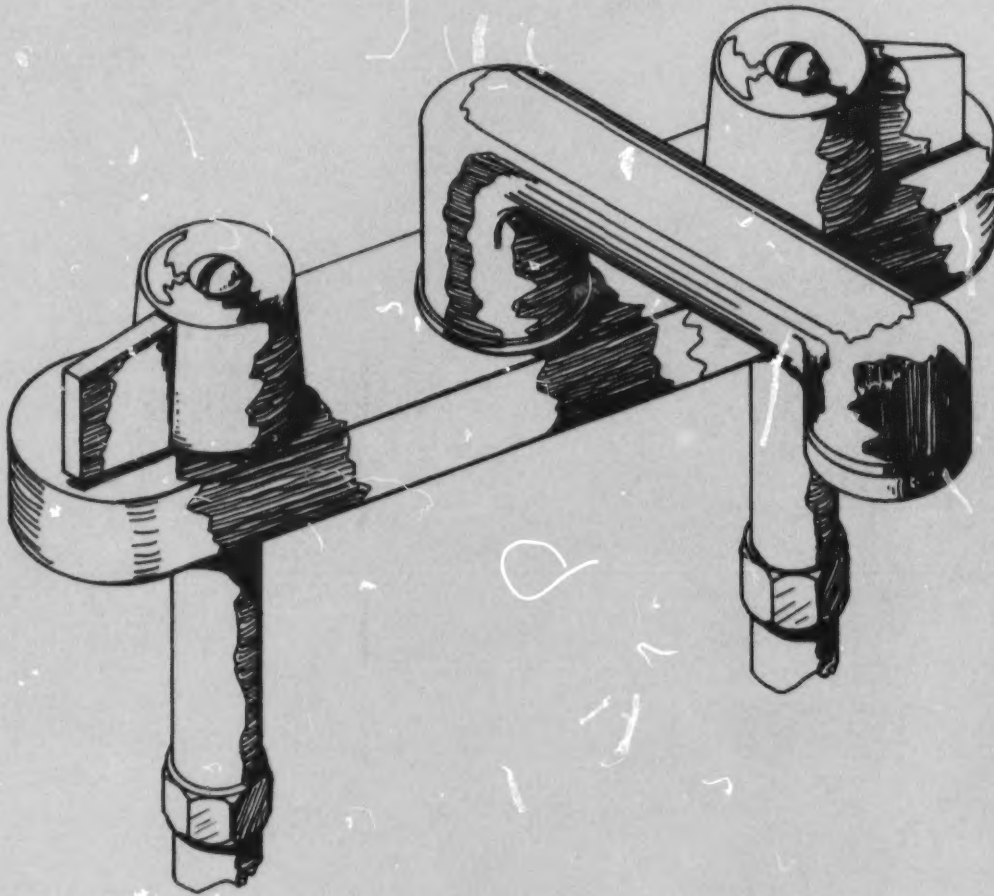
ABSTRACT

This document is a curriculum guide for instructors teaching vocational preparation for plumbing to special needs students. The purpose of the curriculum guide is to provide minimum skills for disadvantaged and handicapped students entering the mainstream: to supplement vocational skills of those students already in a regular training program (mainstream); and to provide vocational instructional materials for the modified classroom. Ten units of self-paced and self-contained instructional materials are contained within the plumbing curriculum. Units are illustrated and simplified to more easily aid a student in class activities or on an individual basis. The separate sections of each unit are color coded and consist of the following: objective and student assessment (presents the unit objectives and provides self-assessment statements for students); introduction (contains a brief motivational statement describing the theme of the units); tools, materials, and equipment needed to complete the exercise; steps of the procedure, with illustrations; and student evaluation to be used by the instructor. Topics covered in the 10 units include job opportunities in welding, safety rules in plumbing, measuring and cutting pipes, reaming and threading pipes, soldering, making a flare joint, making a plastic pipe joint, repairing faucets, replacing a toilet bowl, and clearing a main drain. (KC)

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SN-7-S

Vocational Preparation Curriculum



Plumbing

Developed By: Hogan Usoro

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
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Vocational Preparation Curriculum PLUMBING

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Vocational Preparation Curriculum PLUMBING

Preface

This Vocational Preparation Curriculum guide is a Special Needs project sponsored by the Missouri Department of Elementary and Secondary Education. The purpose of this curriculum guide is:

1. to provide minimum skills for disadvantaged and handicapped students entering the mainstream,
2. to supplement vocational skills of those students already in a regular training program (mainstream),
3. to provide vocational instructional materials for the modified classroom.

This guide is intended to be a workable guide for instructors serving the occupational needs of various categories of Special Needs students.

Ten units of self-paced and self-contained instructional materials are contained within this plumbing curriculum. Units are illustrated and simplified to more easily aid a student in class activities or on an individual basis.

Each unit is color coded to represent a separate section within the unit, the color coding is:

White: Objective and Student Assessment - Presents the unit objectives. The student must meet these objectives to successfully complete the unit. Self-assessment statements help the students to determine their ability to perform the unit objectives.

Goldenrod: Introduction - Contains a brief motivational statement describing the theme of the unit.

Salmon: Tools, Materials, and Equipment - Introduces new tools, materials, and equipment necessary to complete the exercise.

Canary: Steps of Procedure - Presents a step by step explanation and illustration of the skill to be learned.

Pink: Student Evaluation - Used by the instructor to evaluate student performance. Three different forms of evaluation are presented; true-false, identification, and Steps of Procedure Evaluation.

Material within this curriculum is developed to provide a source and guideline for the instructor. The responsibility of the instructor will be to adapt material as is necessary to suit a given teaching/learning situation. It is intended that this material will provide a basis for that adaptation.

Vocational Preparation Curriculum PLUMBING

Acknowledgments

The Vocational Preparation Curriculum guide is the outcome of the expenditure in time, effort and talents of the following individuals.

Committee Members:

Ed Flanigan, Instructor, Waynesville Area Vocational-Technical School

Steve Parker, Instructor, Rolla Area Vocational-Technical School

Jim Walker, Instructor, Cass County Area Vocational-Technical School, Harrisonville, MO

Robert Wagner, Instructor, Graff Area Vocational-Technical School, Springfield, MO

Mr. Miles Beachboard, Director of Vocational Special Needs Programs, Department of Elementary and Secondary Education, Jefferson City, Missouri

Mr. Larry Lutz: Director, Camdenton Area Vocational-Technical School

Instructional Materials Laboratory, University of Missouri-Columbia

Greg Leech: Graphic layout specialist for illustration and paste-up work

Tammy Begley and Mitzi Groves: Composition typists, for their work in typesetting and editing

Phyllis Miller: Editor, for editing the curriculum material

Dr. Harley Schlichting: Director of Instructional Materials Laboratory, for his special assistance in the preparation and completion of this Vocational Preparation Curriculum

Appreciation is also expressed to Dr. F.M. Miller of the Practical Arts and Vocational-Technical Education department and Dr. C.T. Cameron, Special Education department, University of Missouri-Columbia, for their contributions toward the development of the format in this curriculum.

A special thanks goes to all the other individuals who made contributions toward the completion of this project.

Notes to the Instructor

- Step 1 Read through the information in this unit before presenting it to the student.
- Step 2 Make sure all tools and materials to be used in this unit are available.
- Step 3 Prepare any handouts, if applicable, to aid student learning activities.
- Step 4 Provide the student with self-assessment (objective) sheet.
- Step 5 Discuss tasks on self-assessment sheet and give directions for completing the Show What You Can Do section.
- Step 6 Have student complete self-assessment sheet.
- Step 7 If the student elects to take the Practical Exercise and completes it to the satisfaction of the instructor, have the student proceed to the next package. If the student fails to complete the Practical Exercise to your satisfaction or does not wish to take the exercise, proceed to Step 8.
- Step 8 Provide and discuss the Introduction sheet with the student. At this time you can also discuss the Tool, Materials and Equipment list.
- Step 9 Provide the student with Steps of Procedure.
- Step 10 Present the Steps of Procedure. Depending on the capabilities of the student, select one or more of the following means of presentation:
 - a. have student study information independently,
 - or
 - b. go through the Steps of Procedure with the student individually or as a group.
- Step 11 Instructor can demonstrate the procedures to the student or the group.
- Step 12 Allow the student time to practice the procedure.
- Step 13 When the student feels ready, use the Practical Exercise Checklist to evaluate the student's performance capabilities.

Additional Suggestions for the Instructor

Try team approach when possible.

Beginning students can work together after instructor's demonstration.

One student experienced with the procedures can work with a beginner.

For non-readers, audiotapes or videotapes of the lesson could be prepared.

Review tools and materials with the students whenever necessary. Tools and Materials Identification Exercises are provided in some units for instructors' use.

Tools and Materials Identification Exercises can be used in the following suggested way:

As a pencil and paper exercise

Actual Tool/Material Identification: Instructor holds up or points to an actual tool or material for the student to identify, or the instructor names a particular tool or material and asks the student to locate it.

Name-Object Association: Instructor prepares cards with names of tools and materials. The student matches the name card with correct object.

Additional modifications of above suggestions can be effected by the instructor to take care of other special needs conditions.

Plan visits to local plumbing shops.

Vocational Preparation Curriculum PLUMBING

Class Progress Chart

Student's Name

WHAT THE STUDENT CAN DO

Observe Safety Rules in Plumbing

Measure and Cut Pipes

Ream and Thread Pipes

Solder Pipe Connections with a
Propane Torch

Make a Flare Joint

Make a Plastic Pipe Joint

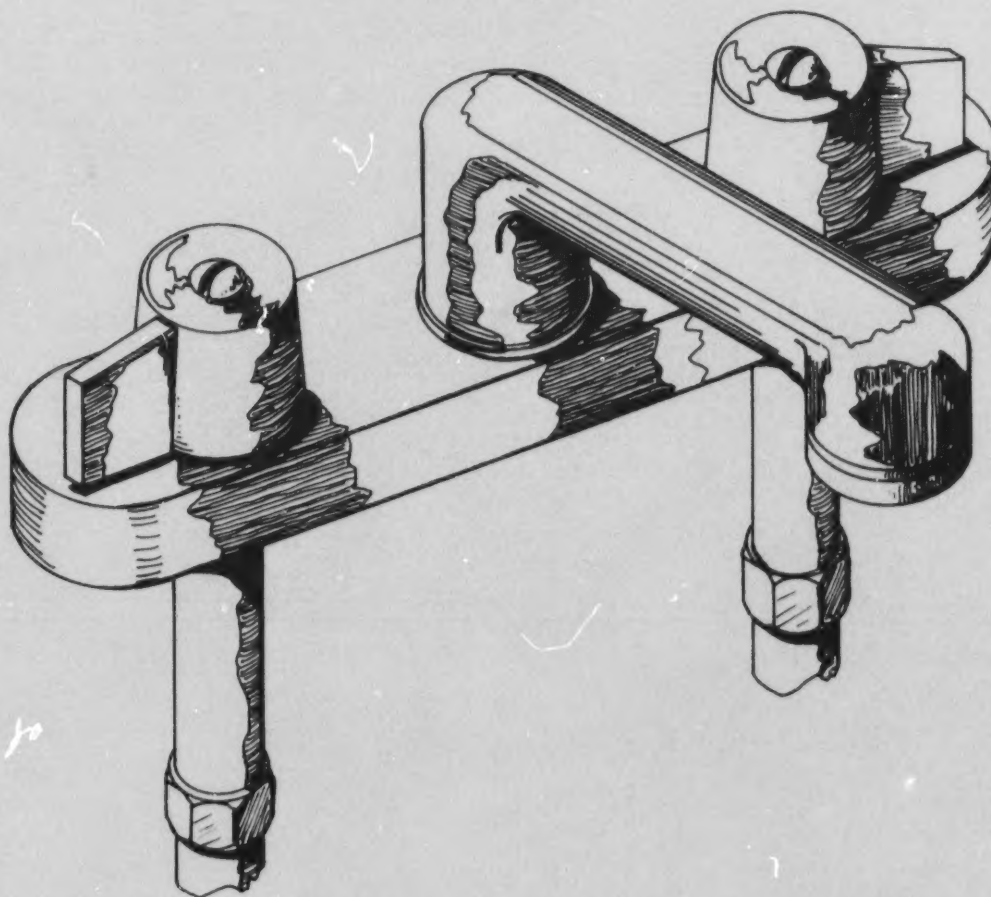
Repair Faucets

Replace a Toilet Bowl

Clear a Main Drain

Instructor's Signature Date

Vocational Preparation Curriculum
PLUMBING



Unit 1

Job Opportunities in Plumbing

Developed by: Hogan Usoro

Unit 1

Job Opportunities in Plumbing

Job Opportunities in Plumbing.

After you study this lesson, you should be able to:

1. Name and locate plumbing jobs in your area.
2. Identify some job opportunities in plumbing.
3. Name a plumbing occupation you would like and tell why.

Show What You Can Do.

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



TURN THE PAGE AND BEGIN

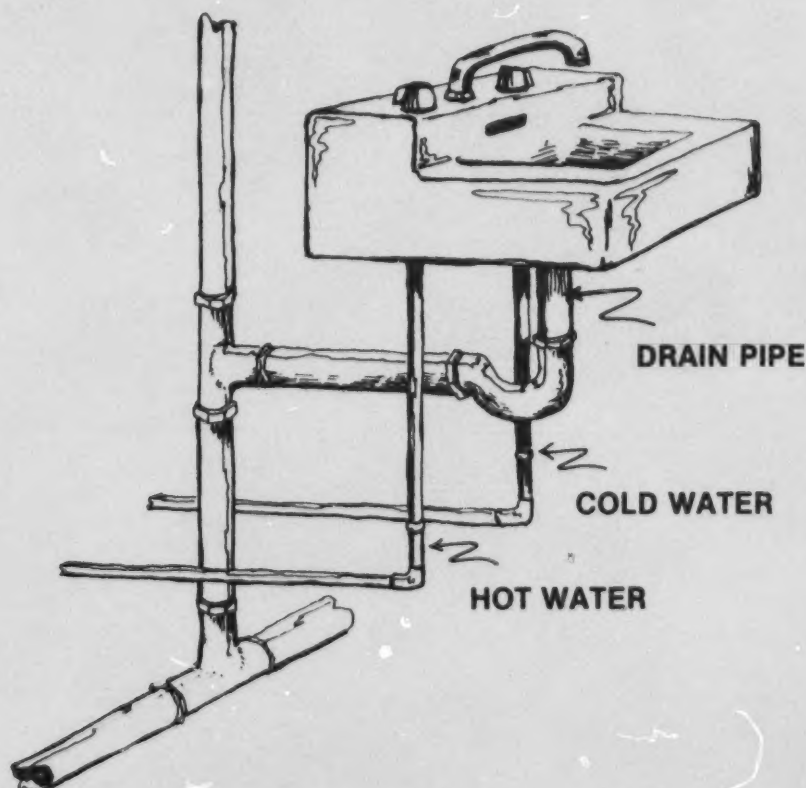
Unit 1

Job Opportunities in Plumbing

Introduction

Many different people and different jobs are needed before plumbing work can be done. Before a plumber can connect water pipes in a house a plan must be drawn, workers must be hired, jobs must be scheduled, material must be delivered and plans must be approved.

This unit will show you some of the many types of job opportunities in plumbing.



TURN TO NEXT PAGE

Unit 1

Job Opportunities in Plumbing

A. Employment Related to Plumbing.

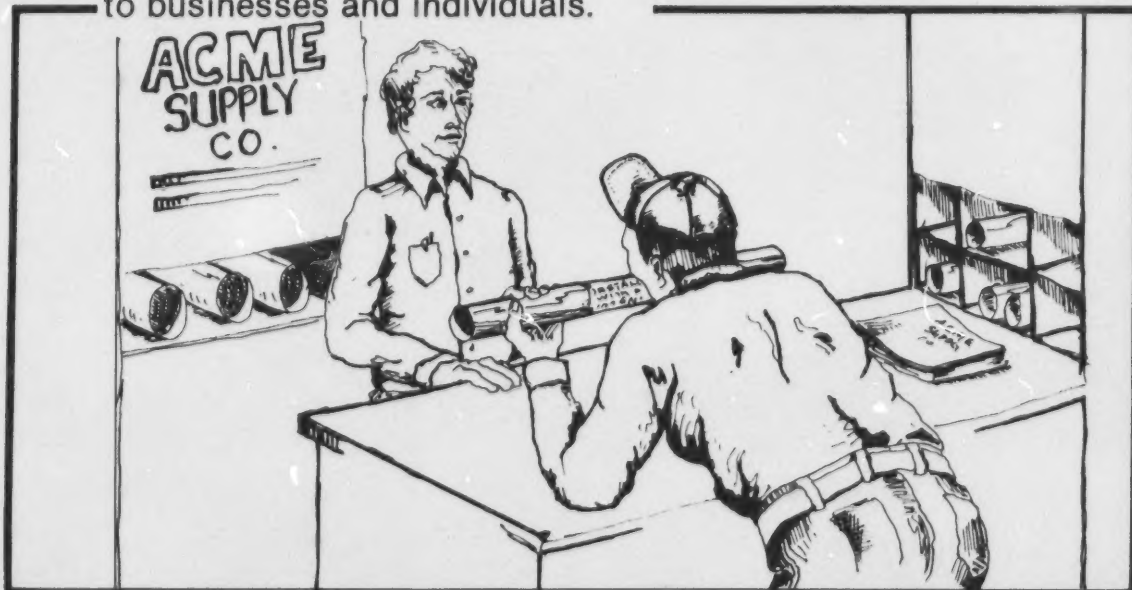
Many different jobs exist in addition to being a plumber. The following are some of the more common plumbing occupations in which you can work.

1. **PLUMBING BUSINESS:** Does a variety of plumbing activities:

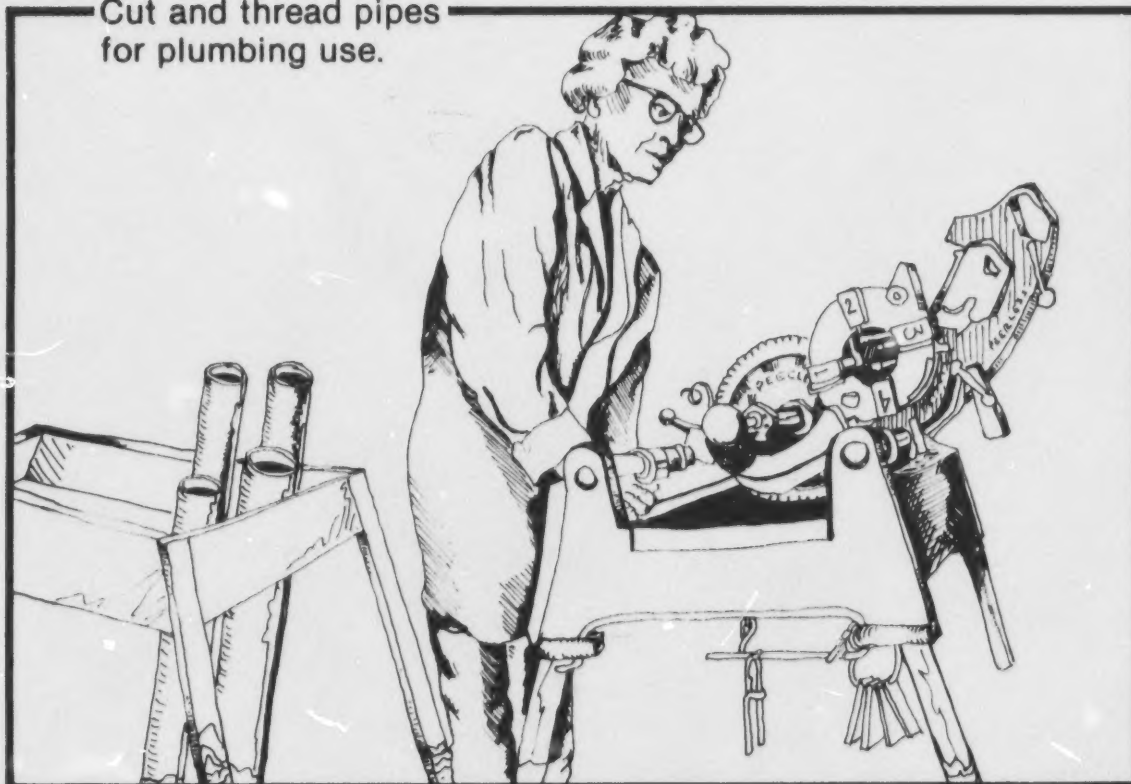
Install and repair plumbing.



Store and sell plumbing materials
to businesses and individuals.

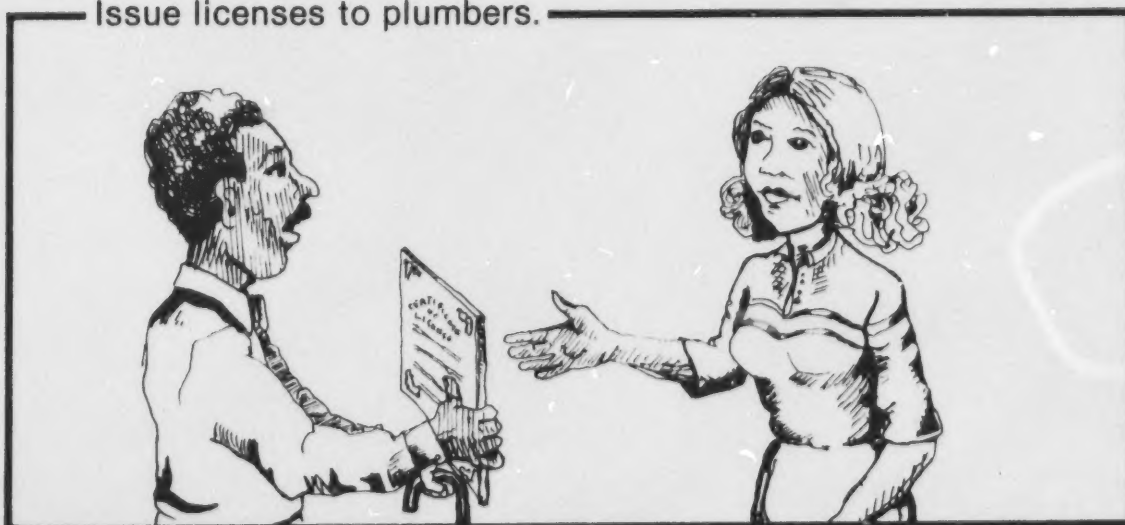


Cut and thread pipes
for plumbing use.



2. **GOVERNMENT AGENCIES:** Work with plumbing occupations in
several ways.

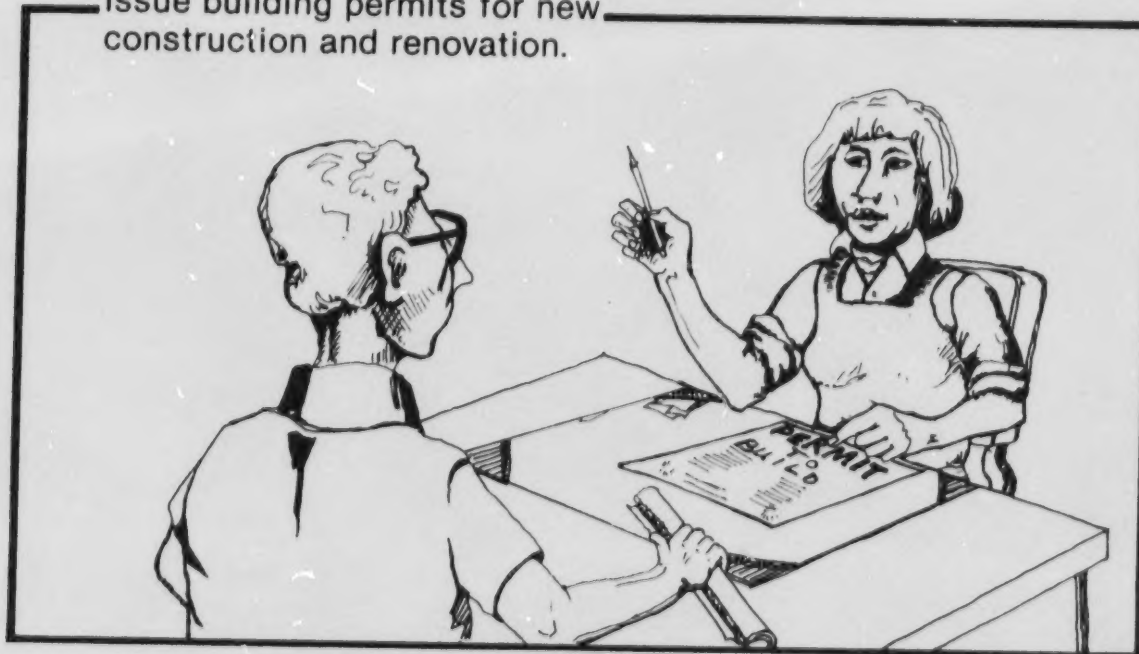
Issue licenses to plumbers.



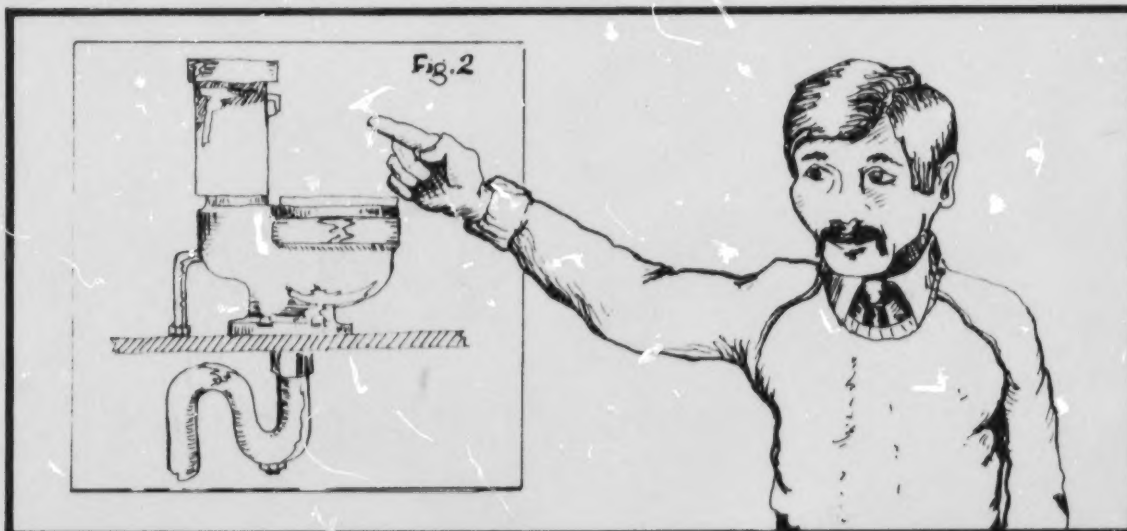
Inspect and approve plumbing plans for buildings.



Issue building permits for new construction and renovation.



3. **EDUCATIONAL AREAS:** Teach vocational courses in plumbing and related areas after you become experienced.



4. **PLUMBING UNIONS OR RELATED ORGANIZATIONS:** Work to protect interests of plumbers and to act as a source from which contractors can hire workers.



5. **BLUEPRINT DRAFTER:** Has knowledge of plumbing in order to draw plans showing how to install a plumbing system.



B. Job Titles in Plumbing Occupations.

The plumbing occupation offers many job titles and levels of skill. The following are some of the more common job titles.

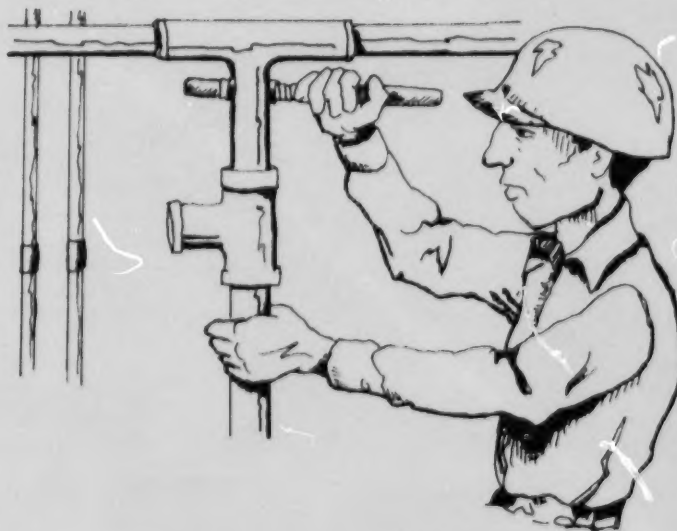
APPRENTICED PLUMBER:

One who is learning the plumbing occupation. During the apprenticeship one learns basic plumbing procedures and gains experience.



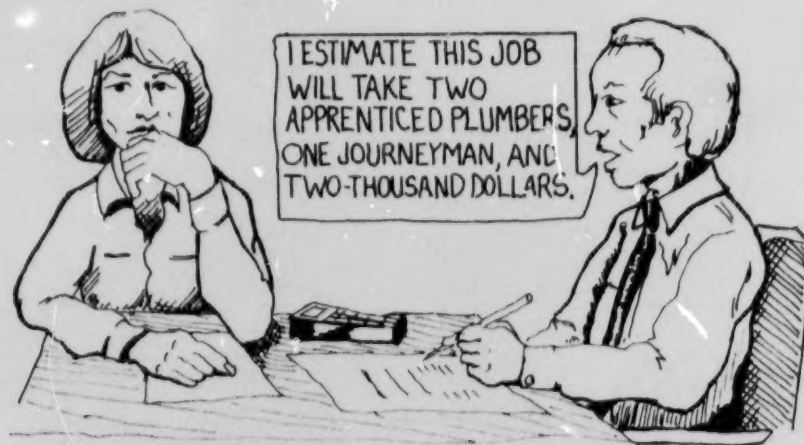
JOURNEYMAN PLUMBER:

One who is licensed to be a plumber. One must have several years of experience and be very knowledgeable to be a journeyman plumber.



MASTER PLUMBER:

An experienced journeyman plumber who is knowledgeable in all areas of plumbing and contract work.



PLUMBING SUPERVISOR:

One who makes work assignments, oversees journeyman plumbers and rechecks their finished work.



PLUMBING CONTRACTOR:

Usually is self-employed. A contractor bids plumbing services to major construction companies and will hire apprentices, journeymen and master plumbers to do work on major construction jobs.



Now that you have learned about plumbing, answer these questions.
Name some plumbing jobs like these that are in your neighborhood.

What type of plumbing work do you want to do? Why?

SEE YOUR INSTRUCTOR

Unit 1

Job Opportunities In Plumbing

Practical Exercise Performance Checklist

Student's Name: _____

True-False Questions:

Circle "T" if the statement is true and "F" if it is false.

- T F 1. A variety of plumbing occupations is possible in a plumbing business.
- T F 2. One of the jobs for a plumber is to put water pipes in houses.
- T F 3. Some plumbing businesses store and sell plumbing materials.
- T F 4. A plumbing business may cut and thread pipe.
- T F 5. Government agencies issue construction permits, check plans and approve plumbers' licenses.
- T F 6. You can never teach plumbing to other people, even if you have experience as a plumber.
- T F 7. A plumbing union protects the interests of bus drivers as well as plumbers.
- T F 8. An apprenticed plumber has many years of experience.
- T F 9. A journeyman plumber has a license to practice a plumbing trade.
- T F 10. A master plumber can never be a contractor.
- T F 11. A plumbing supervisor gives work assignments to other plumbers.
- T F 12. A plumbing contractor cannot hire apprenticed or journeyman plumbers.

Satisfactory Performance ☐

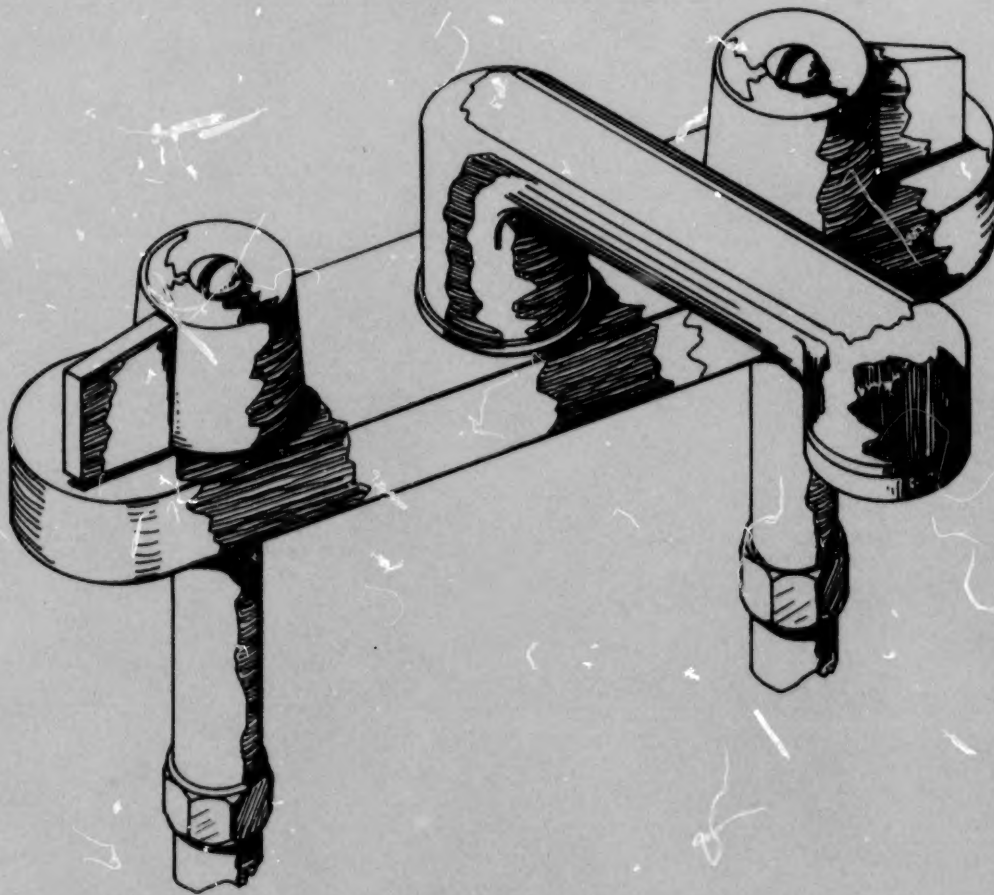
Repeat Exercise ☐

Should Move On ☐

Instructor's Name

Date

Vocational Preparation Curriculum
PLUMBING



Unit 2

Safety Rules in Plumbing

Developed by: Hogan Usoro

Unit 2

Safety Rules in Plumbing

Safety Rules in Plumbing

After you have studied this lesson, you should be able to:

1. Identify an unsafe work area or situation for plumbing.
2. Know about safety rules which should be observed in plumbing.

Show What You Can Do.

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



TURN THE PAGE AND BEGIN

Unit 2

Safety Rules in Plumbing

Introduction

Safety rules must always be remembered and observed as you learn plumbing skills. Accidents caused by not observing safety rules can cause injury, put you out of work and prevent expensive plumbing jobs from being finished on schedule.

In this unit, you will learn about safety rules in plumbing.



TURN TO NEXT PAGE

Unit 2

Safety Rules in Plumbing

A. Clothing Used For Safety.

HARDHAT: For head protection from bumps and dropped objects.



SAFETY GLASSES OR GOGGLES:

For eye protection from dirt, dust and foreign particles.



COVERALLS: To protect your clothing and body from dirt and scratches.

GLOVES: For protection when working with pipes, fittings and fixtures.

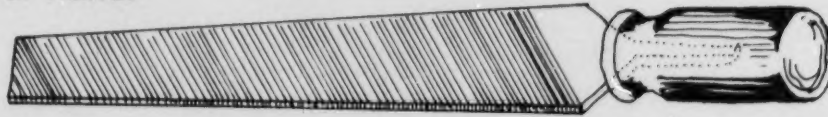


SAFETY SHOES: Usually with steel toes to protect feet from dropped objects.

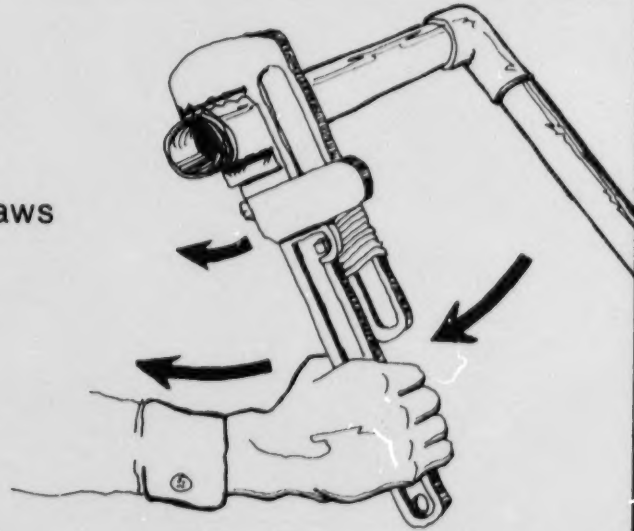


B. Safety in Hand Tools.

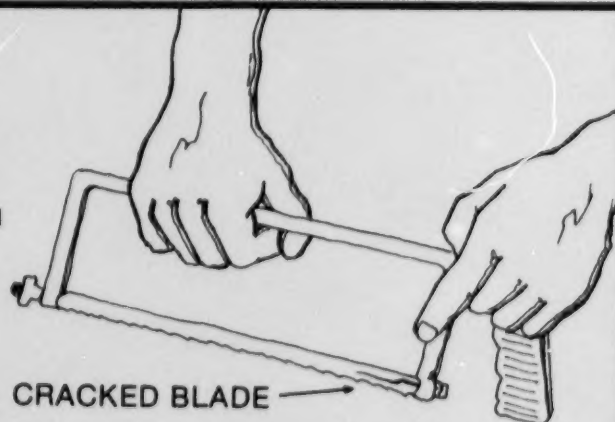
Use a file with a handle.
A file without a handle can
cut your hand.



Place the pipe wrench jaws
in the direction you are
turning.

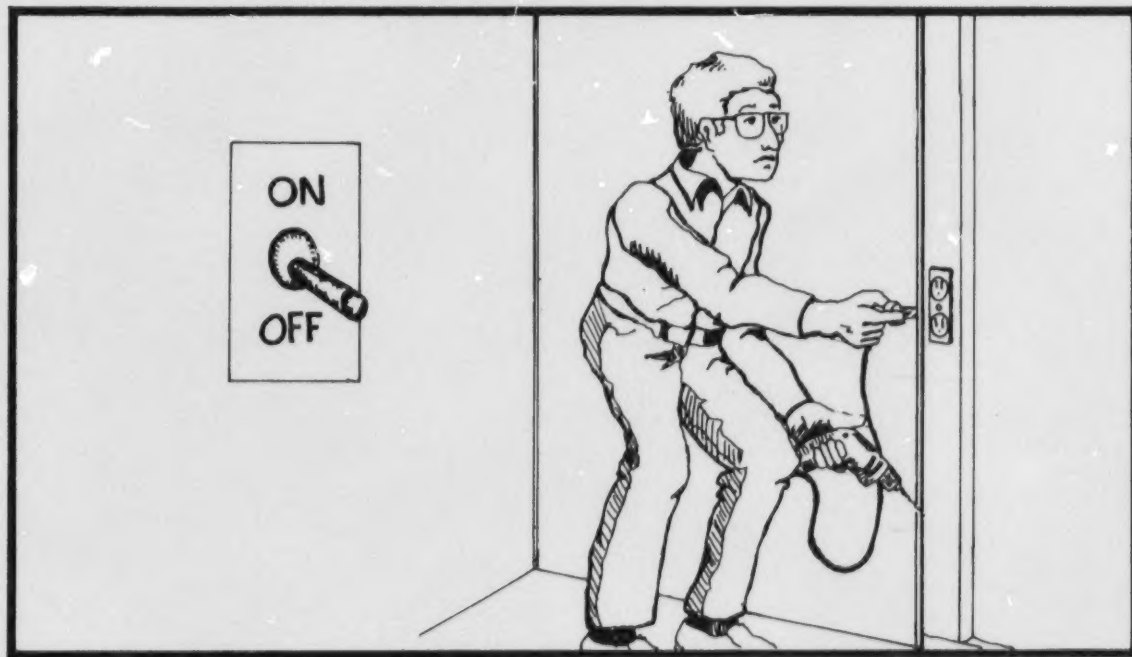


Inspect a tool before you
use it. Do not use a
tool which is in poor
condition.



C. Electrical Safety

Be sure electrical equipment is turned off before you connect it to a power source.



To keep from being electrically shocked . . .

Avoid using ungrounded electrical tools.

Avoid working with electrical tools in damp or wet areas.

Avoid using equipment with a worn or frayed cord.

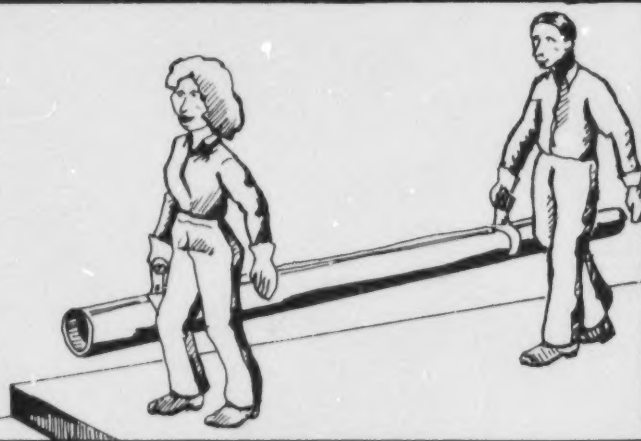


D. General Safety Rules in Plumbing.

Ask for help when lifting or carrying a heavy load.

Use a sling to move heavy pipe.

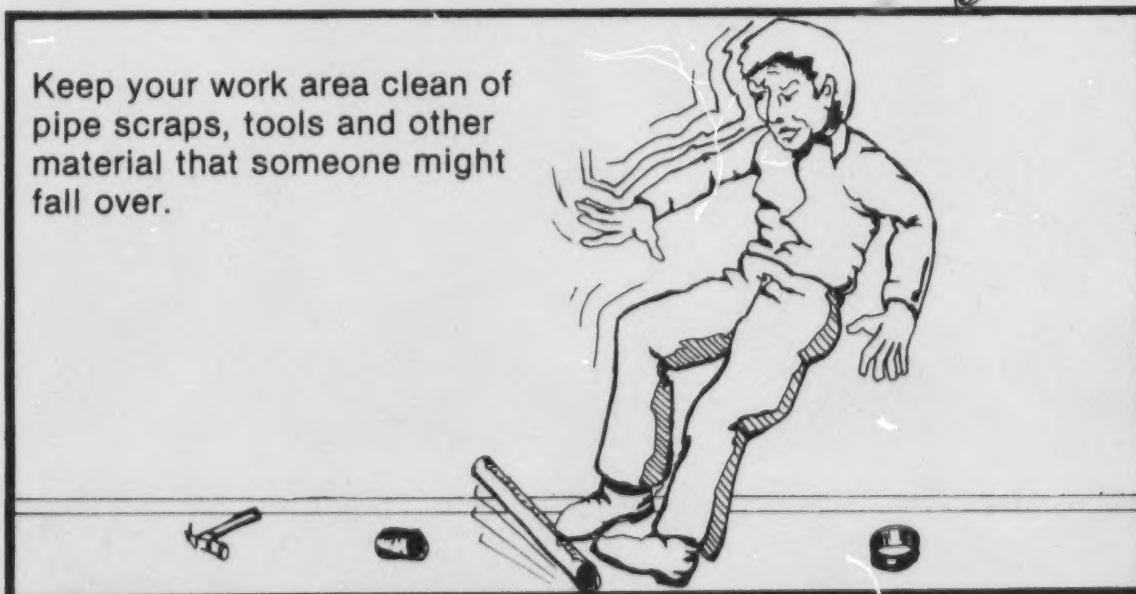
Lift with your legs and not your back.



Horseplay on the job can result in an accident or injury. Avoid this.



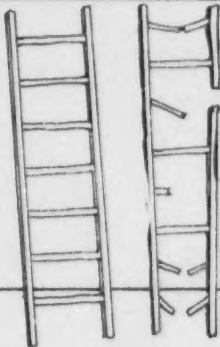
Keep your work area clean of pipe scraps, tools and other material that someone might fall over.



Report all accidents to your supervisor or instructor no matter how small they seem to be.



Use common sense when uncertain about what to do. Or, ask your supervisor or instructor.



I WONDER WHICH LADDER THE SUPERVISOR WANTED?



Think about these safety suggestions. Add other safety rules that you think are important. Discuss these with your instructor.

SEE YOUR INSTRUCTOR

Unit 2

Safety Rules in Plumbing

Practical Exercise Performance Checklist

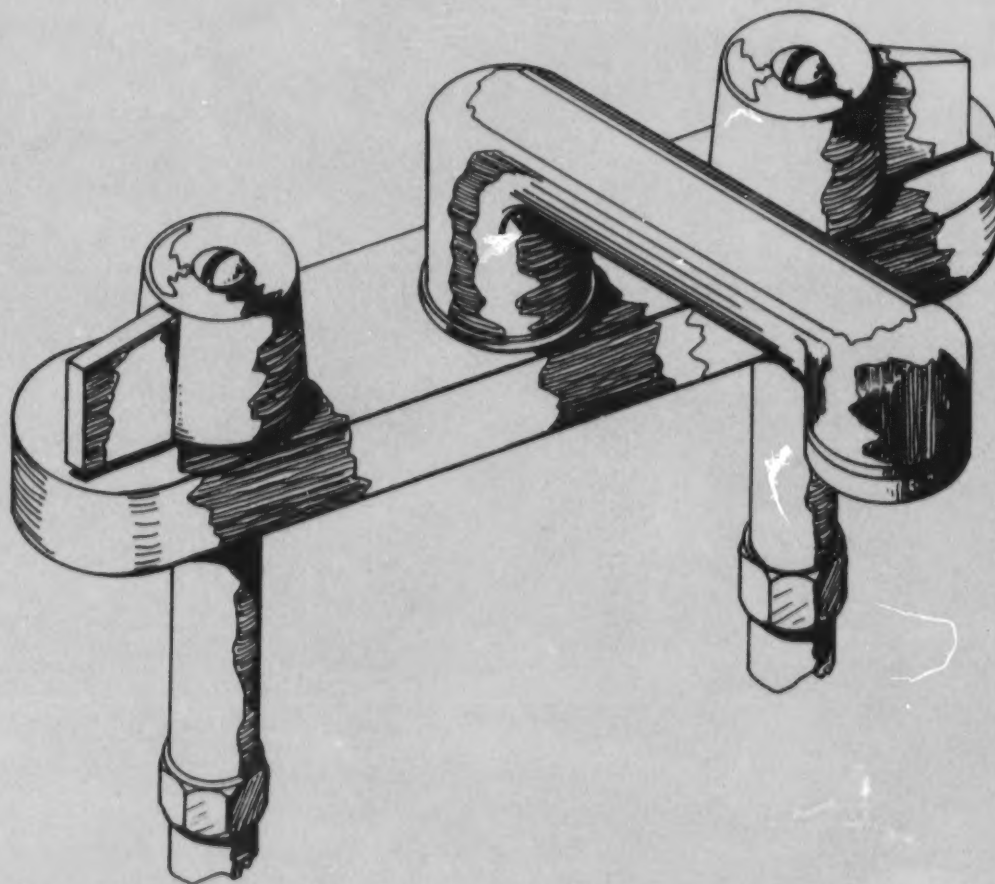
Student's Name: _____

True-False Questions:

Circle "T" if the statement is True and "F" if it is False.

- T F 1. Gloves provide protection for your hands when handling pipes, fittings and fixtures.
- T F 2. It is a good idea not to wear safety shoes when doing plumbing construction because your feet get hot.
- T F 3. Hard hats do not protect your head because they fall off your head.
- T F 4. Coveralls protect your body and clothes from dirt and scratches.
- T F 5. Safety glasses or goggles keep dust and dirt particles from getting in your eyes.
- T F 6. A file without a handle is just as safe as a file with a handle.
- T F 7. Placing the pipe wrench jaws in the direction you are pulling is a safe practice.
- T F 8. Horseplay in a plumbing shop is always fun and safe.
- T F 9. It is a good practice to inspect tools before you use them.
- T F 10. Always be sure the switch is off before you connect electrical equipment to a power source.
- T F 11. It is not a safe practice to use power tools in a damp or wet area.

Vocational Preparation Curriculum
PLUMBING



Unit 3
Measuring and Cutting Pipes

Developed by: Hogan Usoro

Unit 3

Measuring and Cutting Pipes

Measuring and Cutting Pipes

After you study this lesson, you should be able to:

1. Identify tools used in measuring and cutting pipes.
2. Measure and cut pipes to length.

Show What You Can Do.

Check the statement that fits you best.

☐ I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐ I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



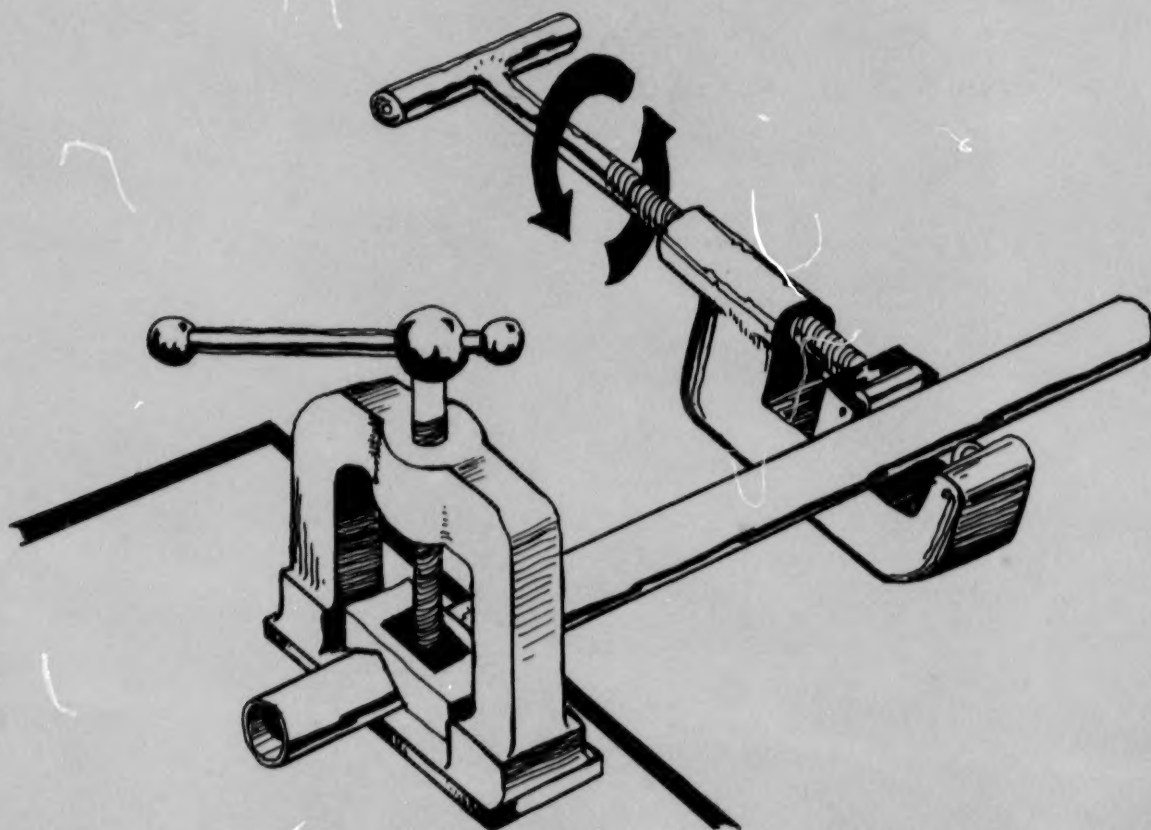
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Unit 3 Measuring and Cutting Pipes

Introduction

When putting a plumbing system into a house, you will have to cut pipes into different lengths to fit. To correctly cut pipe, you must be able to measure the necessary length and know how to operate a pipe cutter or hacksaw.

In this unit, you will learn to measure pipe and cut it with a pipe cutter.



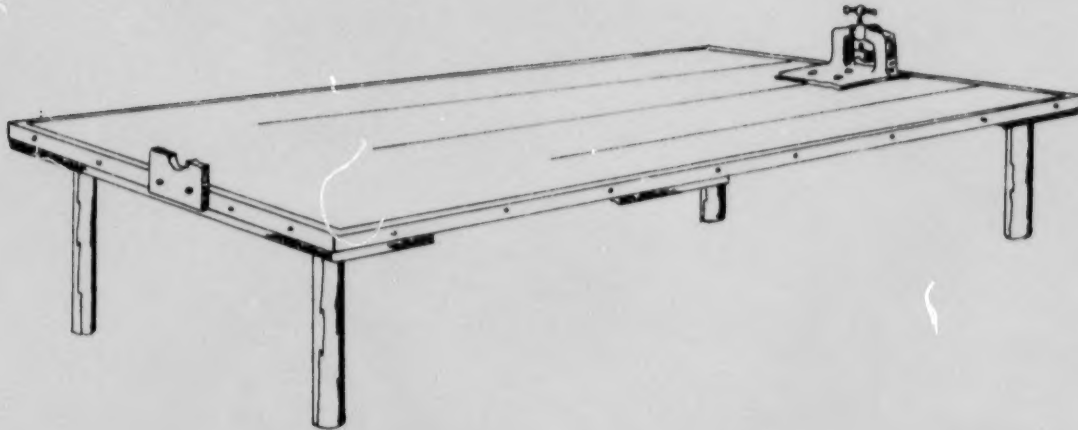
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Unit 3

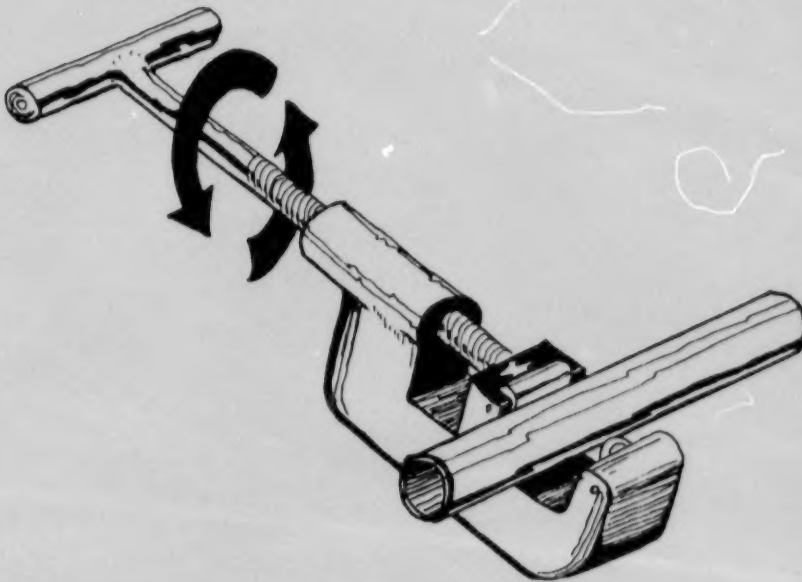
Measuring and Cutting Pipes

A. Tools, Materials and Equipment for Measuring and Cutting Pipes.

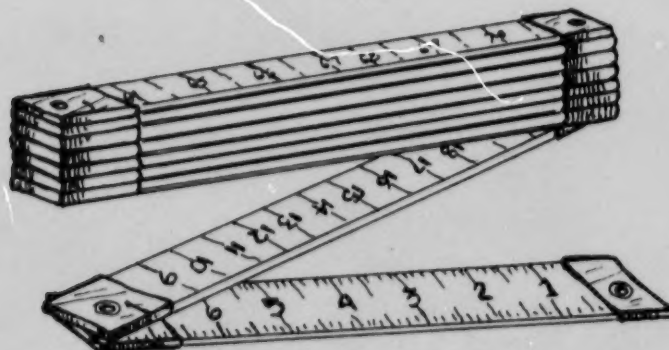
1. **WORK BENCH WITH PIPE VISE:** Used to hold and support pipe for measuring and cutting.



2. **PIPE CUTTER:** Mechanical device used to cut pipes.



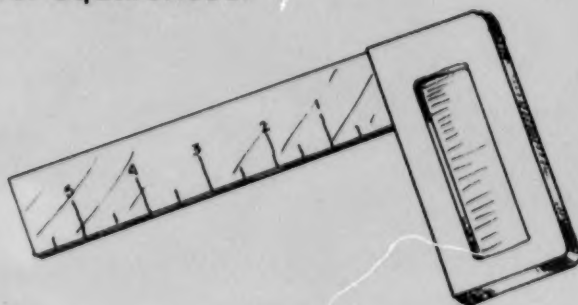
3. **FOLDING RULE:** Rigid rule used to measure lengths of pipe.



4. **TRIANGULAR FILE:** Three-sided file used to mark cutting location on a pipe.



5. **TRI-SQUARE:** 90° angle used to measure and test cut end of a pipe for squareness.



6. **HALF-INCH PIPE:** Metal pipe to be measured and cut to specific length.



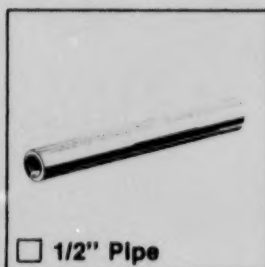
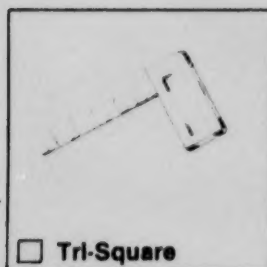
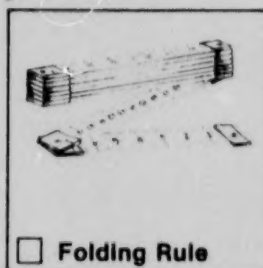
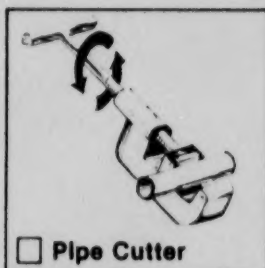
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Unit 3

Measuring and Cutting Pipes

B. Steps for Measuring and Cutting Pipes.

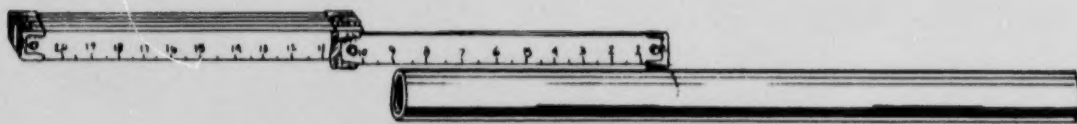
1. Find and Check Off the following:



2. Wear proper safety equipment.



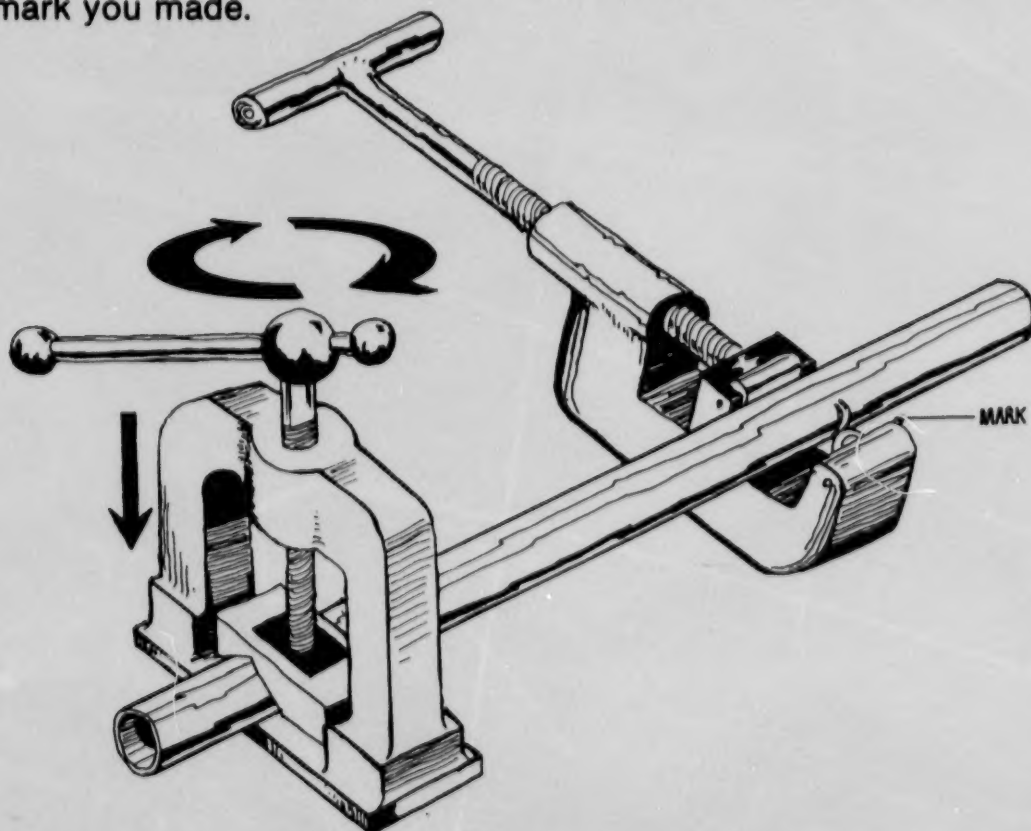
3. Measure the correct length of pipe to be cut.



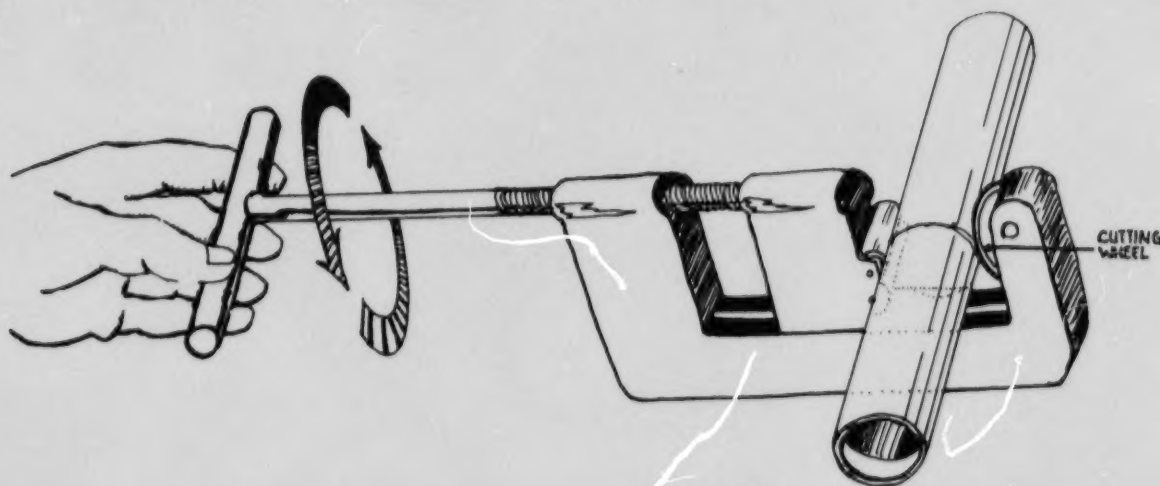
4. Use the triangular file to mark the pipe where it is to be cut.



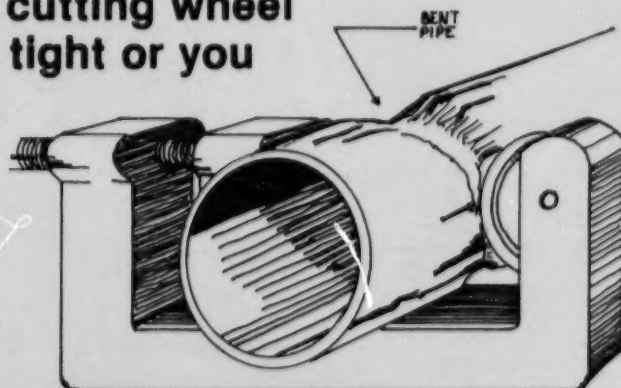
5. Secure the pipe in a pipe vise. Place the pipe cutter on the mark you made.



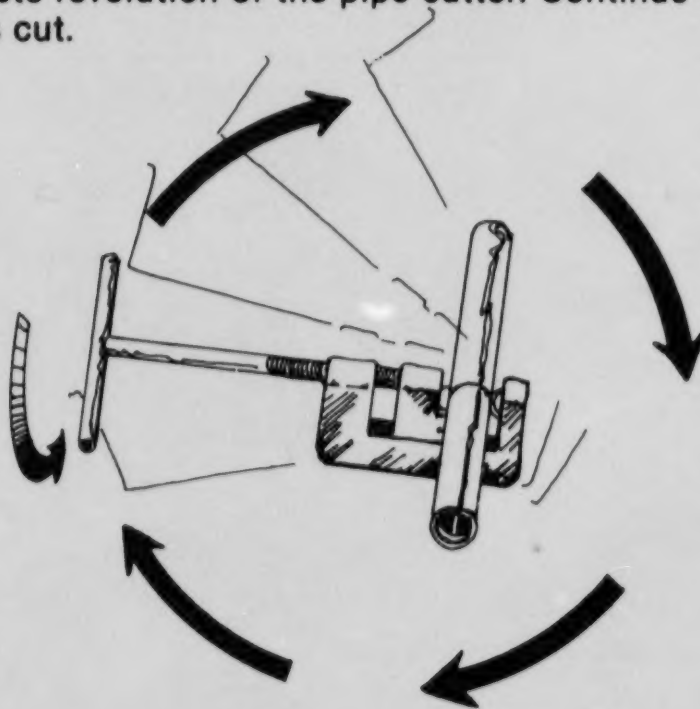
6. Tighten the pipe cutter by turning the handle until the cutting wheel begins to cut into the pipe.



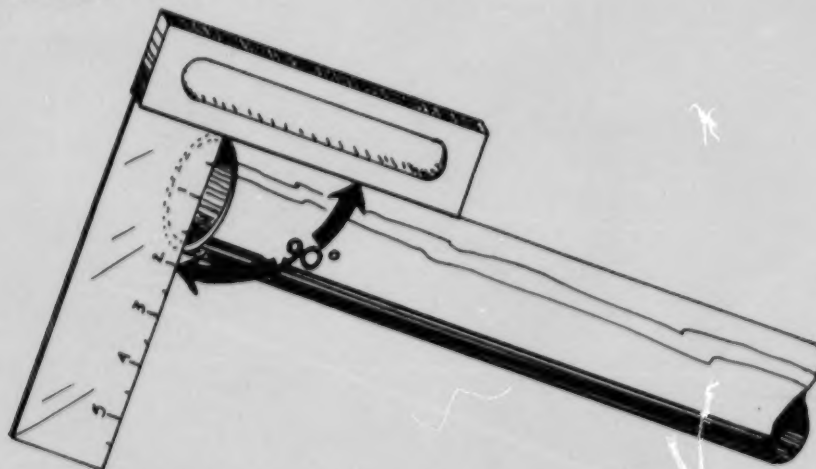
CAUTION!
DO NOT tighten the cutting wheel
against the pipe too tight or you
will bend the pipe.



7. To cut the pipe adjust the pipe handle 1/4 of a turn for every complete revolution of the pipe cutter. Continue this until the pipe is cut.



8. Check the squareness of the cut end with a tri-square. You should have made a 90° cut.



9. Clean your work area and return tools.

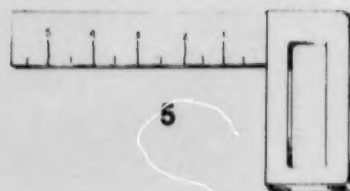
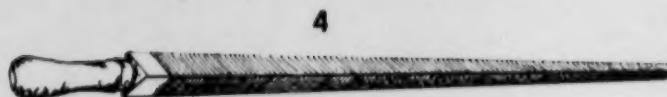
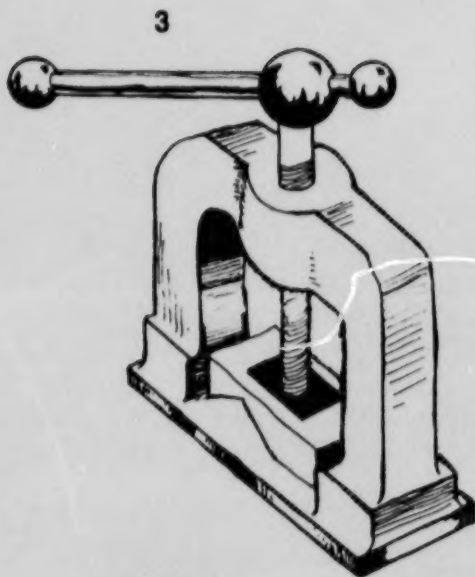
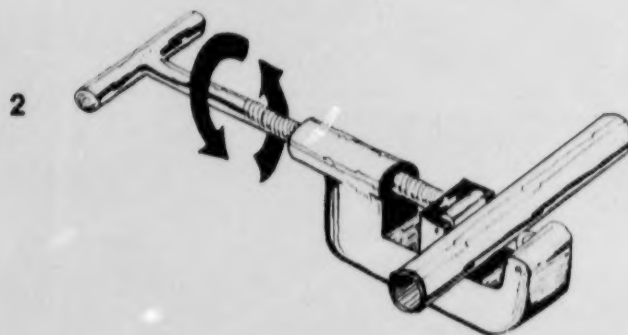
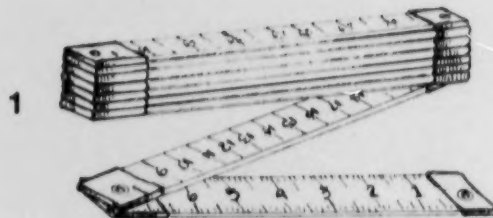
SEE YOUR INSTRUCTOR

Unit 3 Measuring and Cutting Pipes

Tools and Materials Identification Exercise

Match each object with its correct name. <

- ___ A. Pipe Vise
- ___ B. Pipe Cutter
- ___ C. Folding Rule
- ___ D. Triangular File
- ___ E. Tri-Square



Unit 3

Measuring and Cutting Pipes

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
-------	-----	----	----------

1. Identified:			
a. Pipe Vise			
b. Pipe Cutter			
c. Folding Rule			
d. Triangular File			
e. Tri-square			
2. Wore proper protective clothing.			
3. Correctly measured and marked pipe for cutting.			
4. Secured pipe in the pipe vise.			
5. Correctly positioned pipe cutter on the pipe.			
6. Correctly tightened the cutting handle to secure cutting wheel to pipe surface.			
7. Properly cut the pipe.			
8. Checked the cut end of the pipe for squareness.			
9. Cleaned work area and returned tools.			

Satisfactory Performance ☐

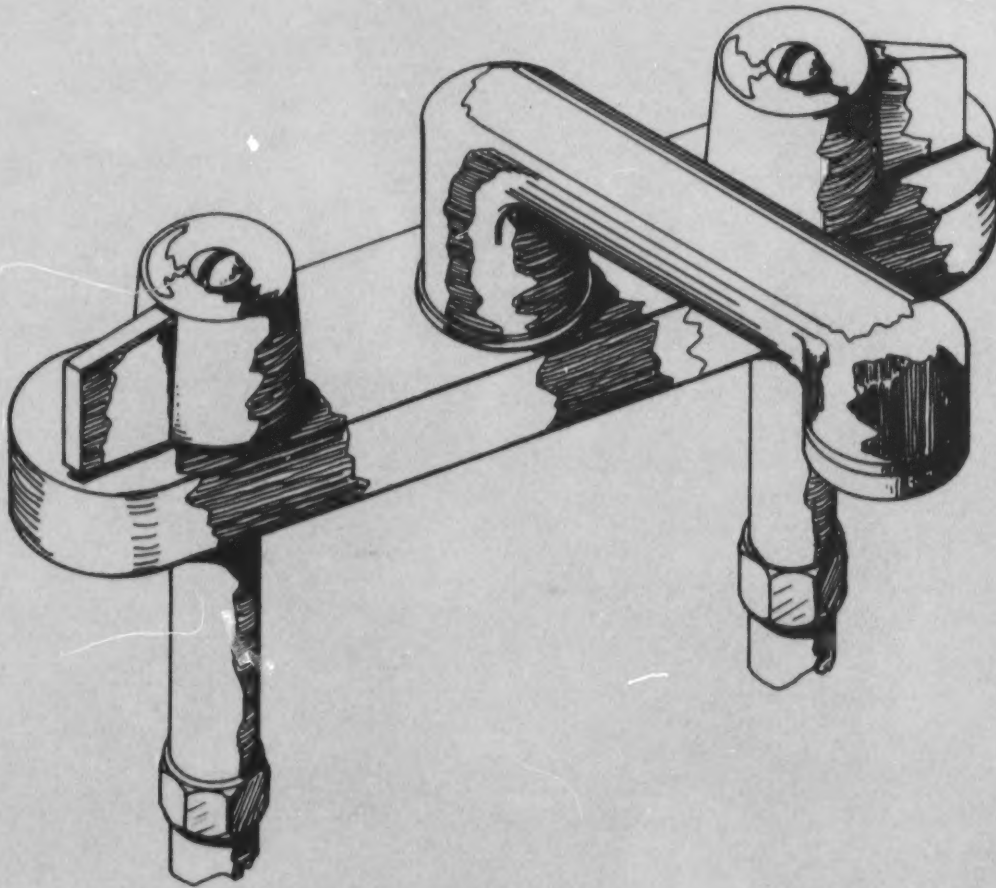
Repeat Exercise ☐

Should Move On ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 4

Reaming and Threading Pipes

Developed by: Hogan Usoro

Unit 4

Reaming and Threading Pipes

Reaming and Threading Pipes

After you have studied this lesson, you should be able to:

1. Identify tools and materials used in reaming and threading pipes.
2. Ream a pipe.
3. Thread a pipe.

Show What You Can Do.

Check the statement that fits you best.

☐

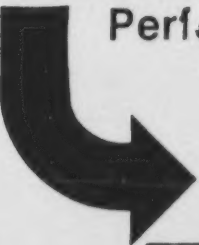
I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.

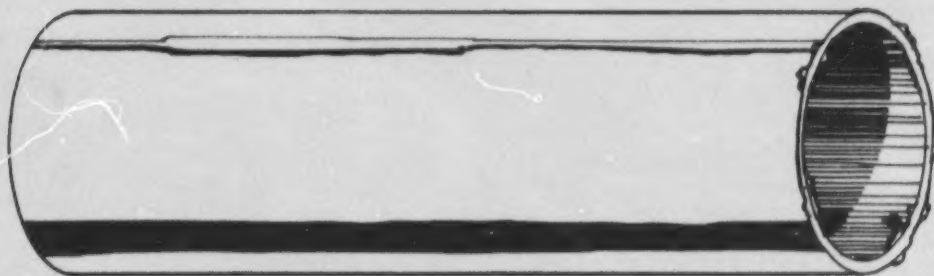


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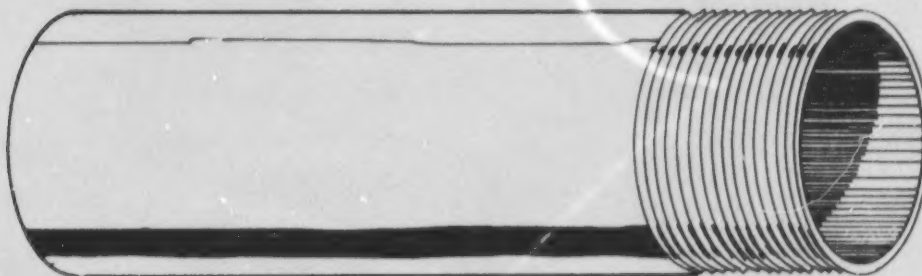
Unit 4 Reaming and Threading Pipes

Introduction

In the last unit you learned how to measure and cut a pipe. Preparing a pipe for installation also involves reaming and threading the pipe. Reaming is smoothing the sharp inside edges from the cut end of a pipe. Threading is cutting grooves or threads on pipe to enable you to screw it to a pipe connection.



Pipe before Reaming and Threading



Reamed and Threaded Pipe

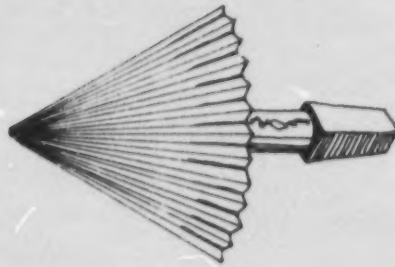
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Unit 4

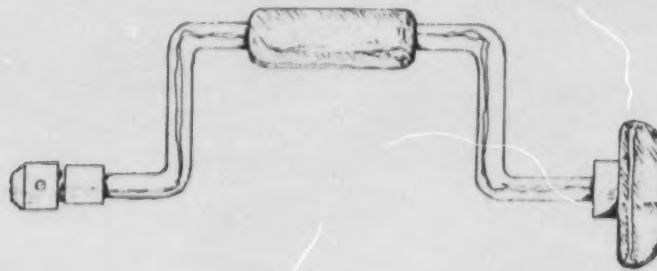
Reaming and Threading Pipes

A. Tools, Materials and Equipment for Reaming and Threading Pipes.

1. **BURR REAMER:** Used with brace to smooth sharp edges or burrs from cut pipe.



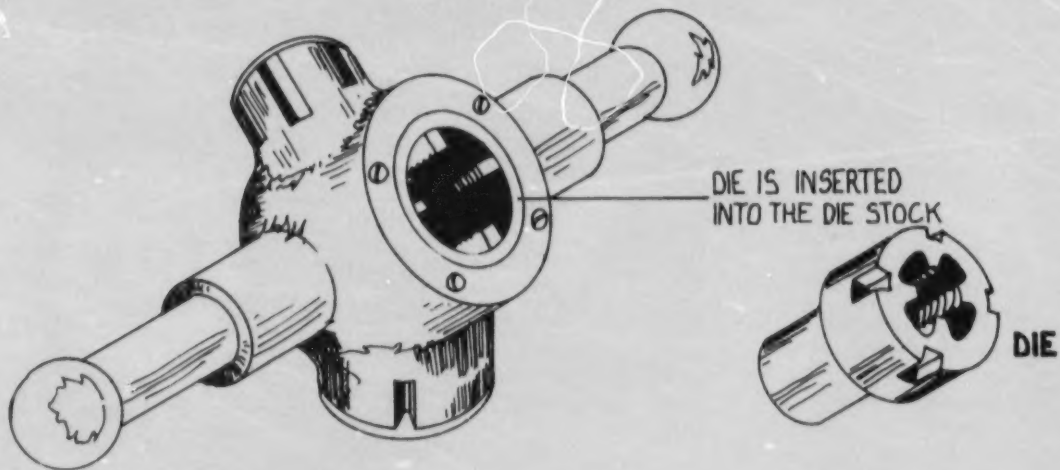
2. **CARPENTER'S BRACE:** Used to hold burr reamer and apply pressure to smooth cut pipe end.



3. **FLAT FILE:** Used to smooth outer edges of a cut pipe end.



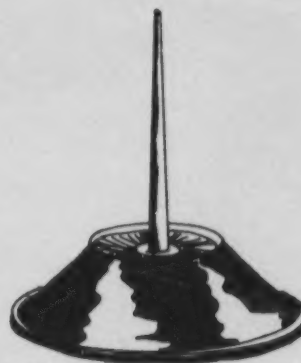
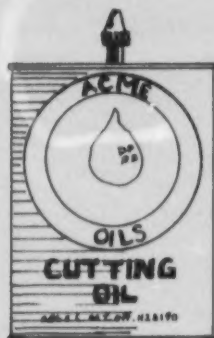
4. **PIPE THREADER:** Device in which threading dies are inserted to cut threads into a pipe.



5. **WIRE BRUSH:** Used to clean metal scraps from threaded section of pipe.



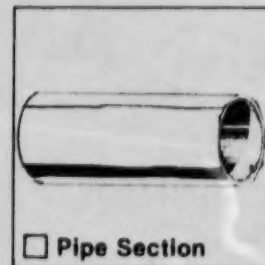
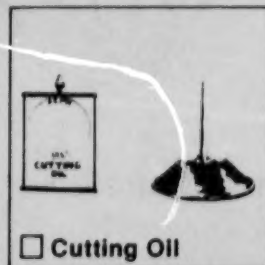
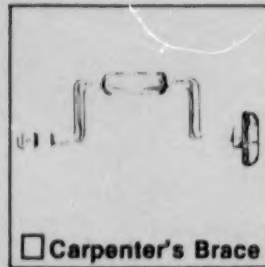
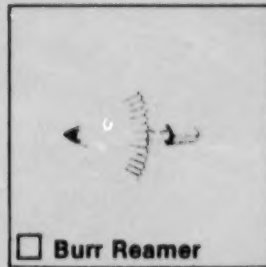
6. **CUTTING OIL:** Used to lubricate and cool metal pipe as it is being threaded.



TURN TO NEXT PAGE

B. Steps for Reaming and Threading Pipes.

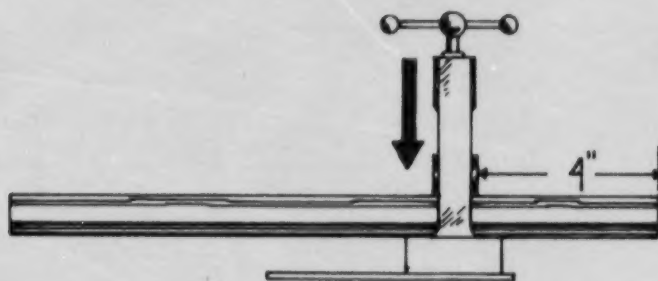
1. Find and Check Off the following:



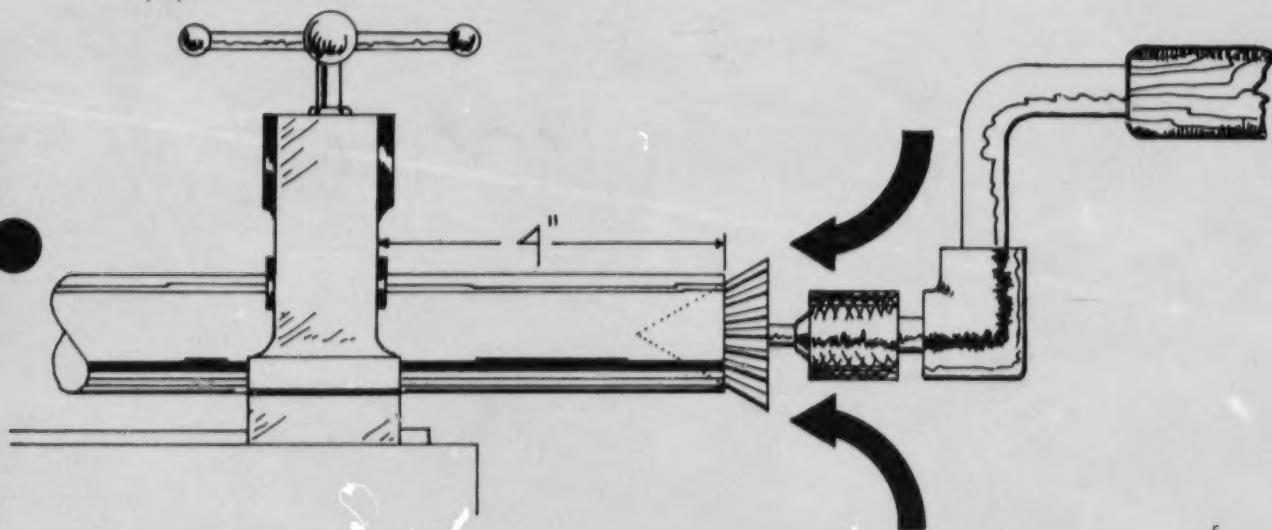
2. Wear proper safety equipment.



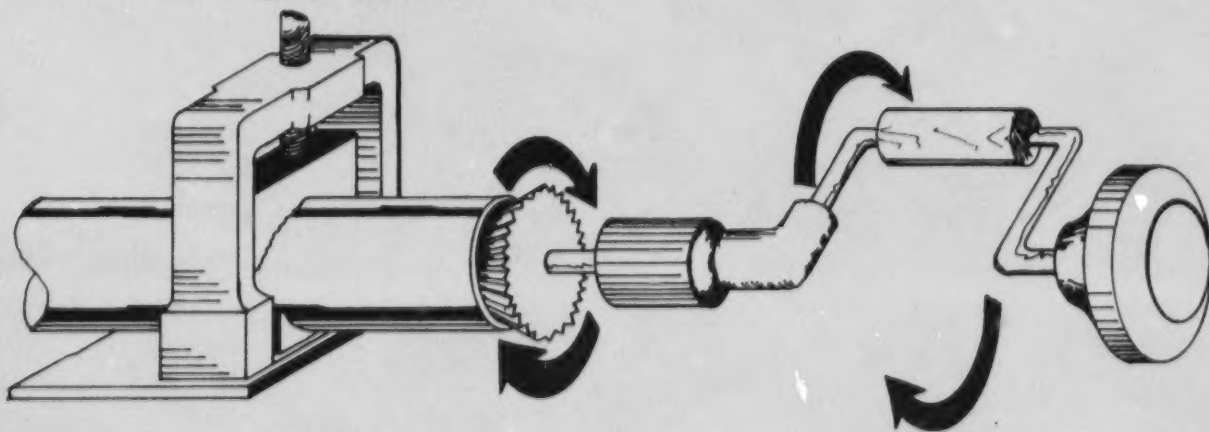
3. Secure pipe section into the pipe vise. Allow about 4" of pipe to extend from the vise.



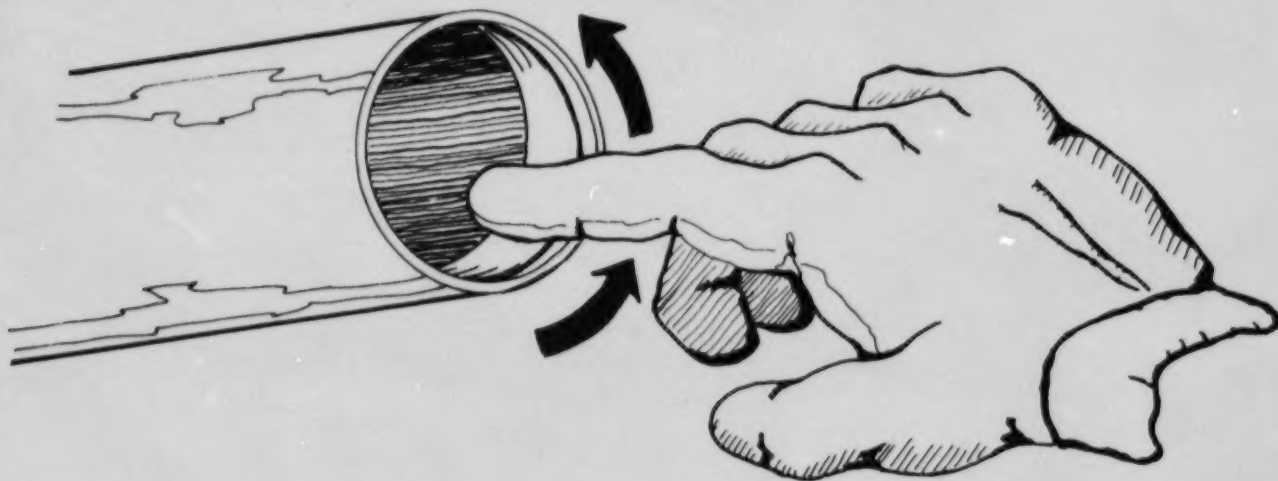
4. Attach reamer to the brace. Insert reamer into cut end of the pipe.



5. Turn the reamer in a clockwise direction until the inside burr or sharp edge is smooth.

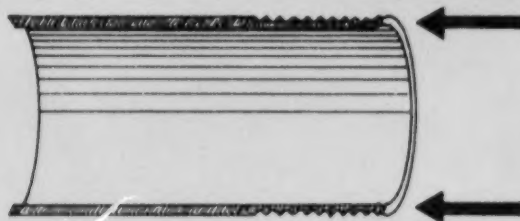


6. Remove the reamer. Run a cloth or your gloved finger around the inside edge to see if the sharp edge is smooth.

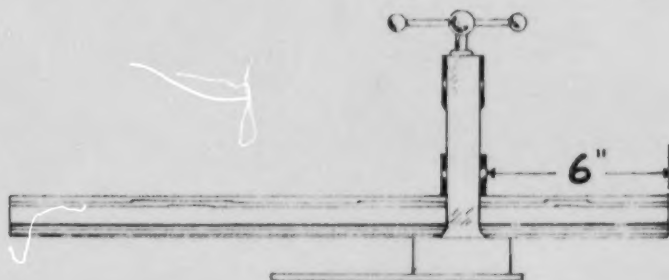


NOTE!

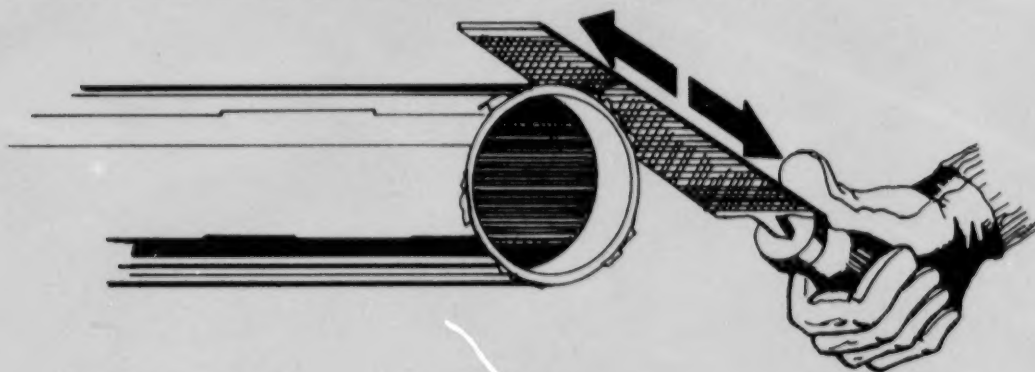
DO NOT ream more than is necessary or you will weaken the thread you cut.



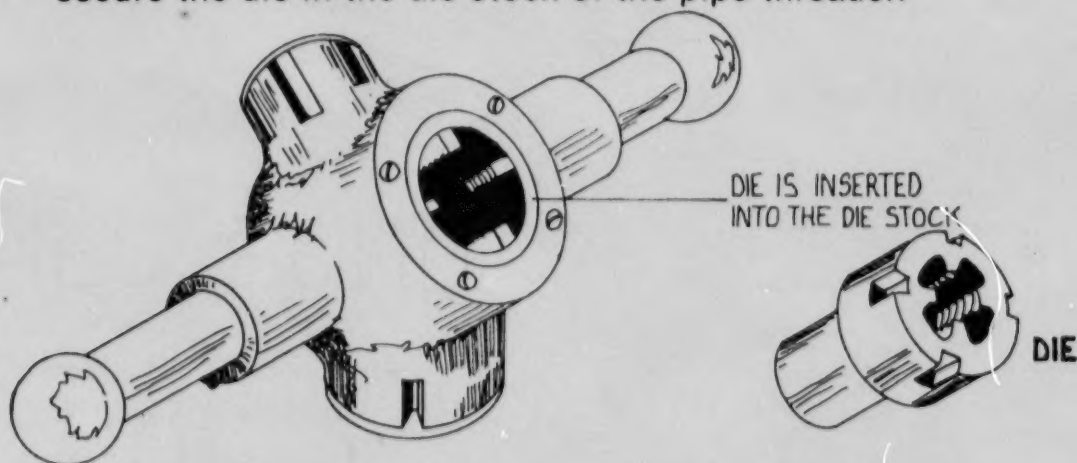
7. Loosen the vise and extend the pipe to about 6" from the vise. Tighten the vise again.



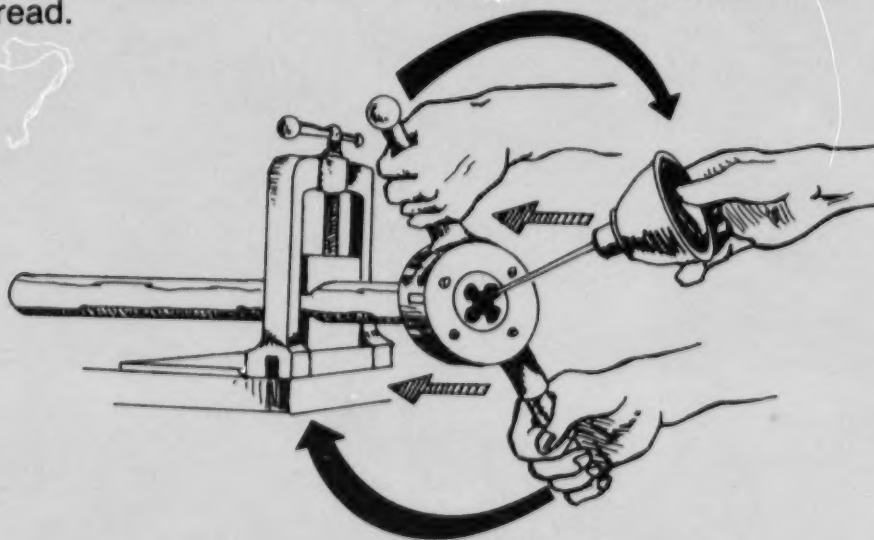
8. File off any burrs or rough edges on the outside.



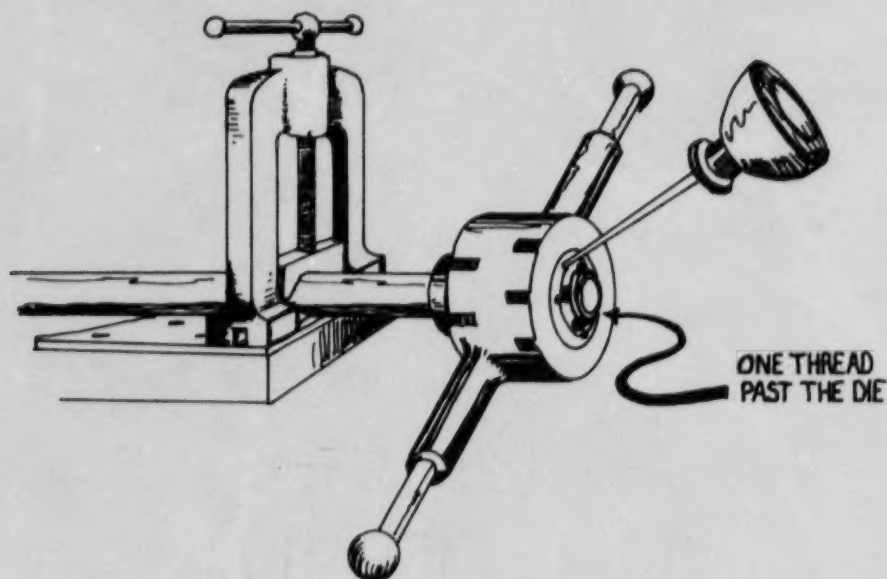
9. With your instructor's help select the proper die size and secure the die in the die stock of the pipe threader.



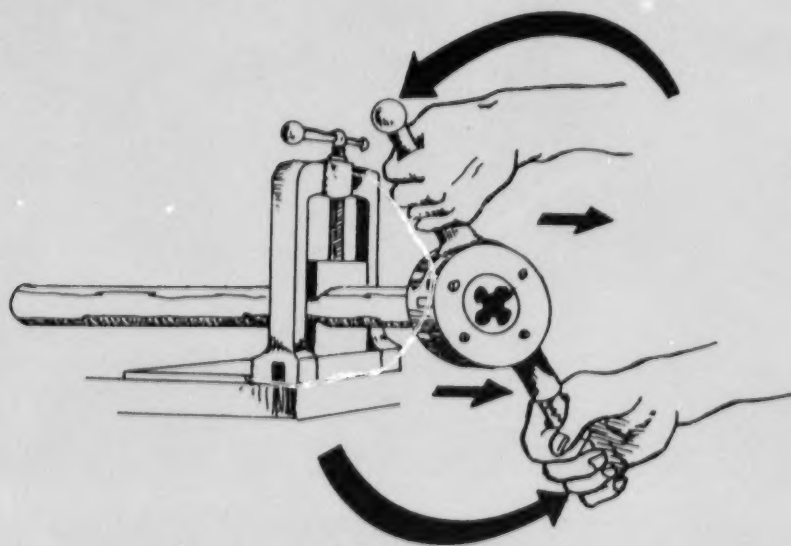
10. Fit the pipe threader onto the pipe end. Apply pressure with your hands and turn clockwise until the die begins to cut a thread.



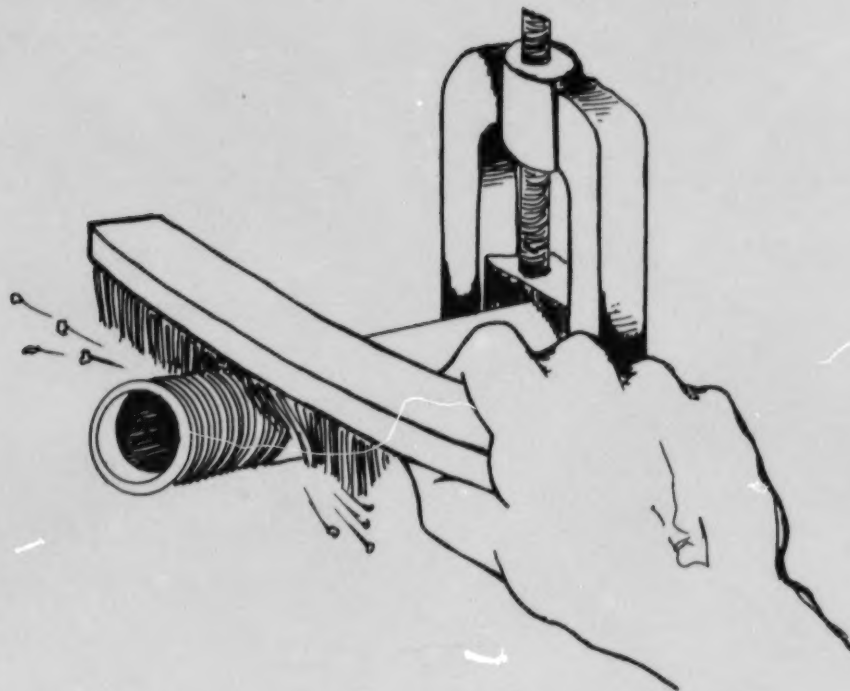
11. Apply cutting oil on the threading area as you cut. Continue cutting until one thread is past the die.



12. Back the die stock off the pipe to inspect the newly cut threads.



13. Clean the threads.



14. Remove the pipe from the vise when threading and cleaning is completed.

15. Clean your work area and return tools to their proper places.

SEE YOUR INSTRUCTOR

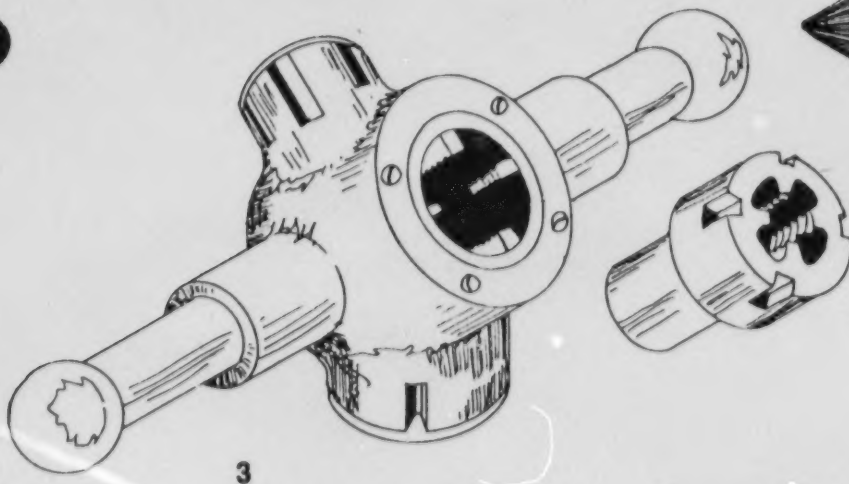
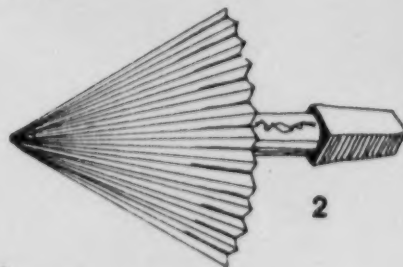
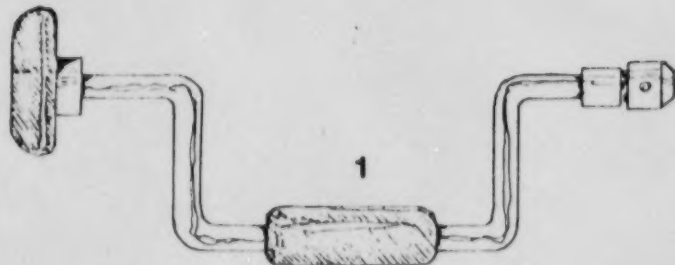
Unit 4

Reaming and Threading Pipes

Tools and Materials Identification Exercise

Match each object with its correct name.

- ___ A. Burr Reamer
- ___ B. Carpenter's Brace
- ___ C. Flat File
- ___ D. Pipe Threader
- ___ E. Wire Brush



Unit 4

Reaming and Threading Pipes

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified:			
a. Burr reamer			
b. Carpenter's brace			
c. Flat file			
d. Pipe threader			
e. Wire brush			
2. Wore proper safety equipment.			
3. Correctly fastened pipe in pipe vise.			
4. Correctly aligned and rotated reamer to remove inside burrs.			
5. Checked inside of pipe for smoothness.			
6. Loosened vise and extended pipe to 6 inches.			
7. Filed off outside burrs.			
8. Selected and placed proper sized die into die stock.			
9. Correctly fitted the die and started cutting threads.			
10. Applied oil as threads were cut.			
11. Cut threads until one thread was past die.			
12. Backed the pipe threader off and inspected threads.			
13. Wire brushed the threads.			
14. Removed pipe from the vise.			
15. Cleaned work area and returned tools.			

Satisfactory Performance ☐

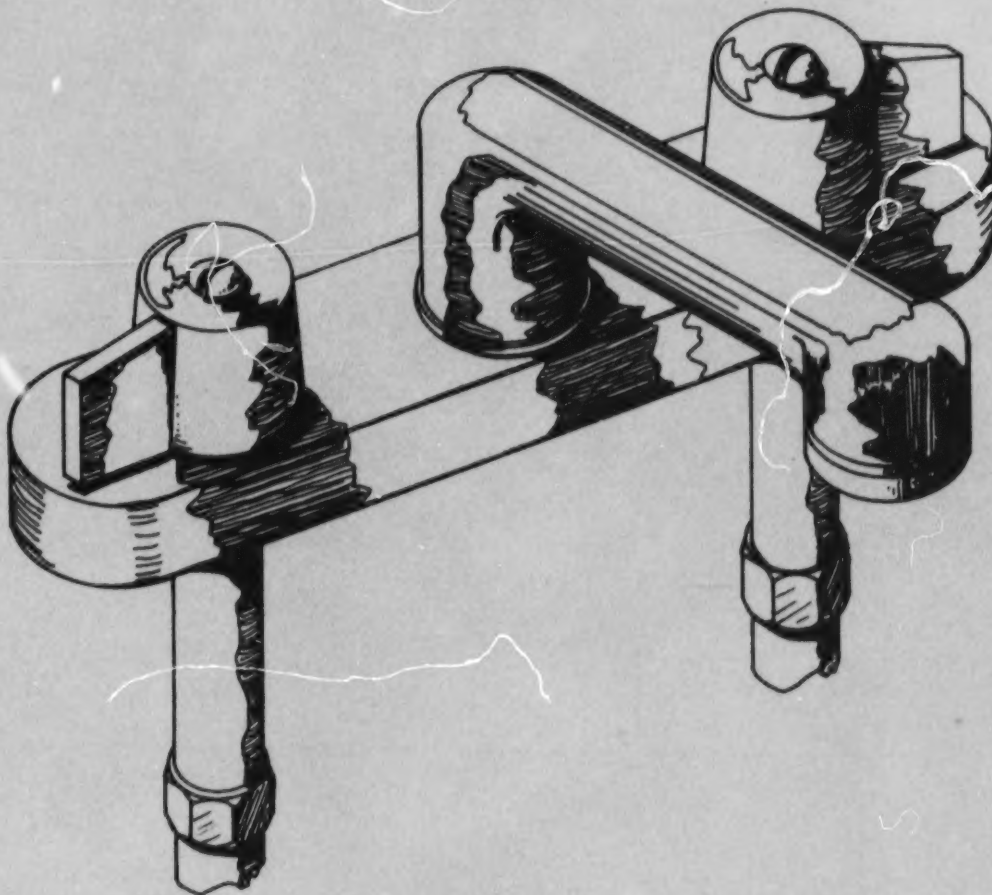
Repeat Exercise ☐

Should Move On ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 5

**Soldering Pipe Connections
with a Propane Torch**

Developed by: Hogan Usoro

Unit 5

Soldering Pipe Connections with a Propane Torch

Soldering Pipe Connections with a Propane Torch

After you study this lesson, you should be able to:

1. Identify tools and materials used in soldering copper pipe connections.
2. Solder pipe connections with a propane torch.

Show What You Can Do.

Check the statement that fits you best.

☐ I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐ I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



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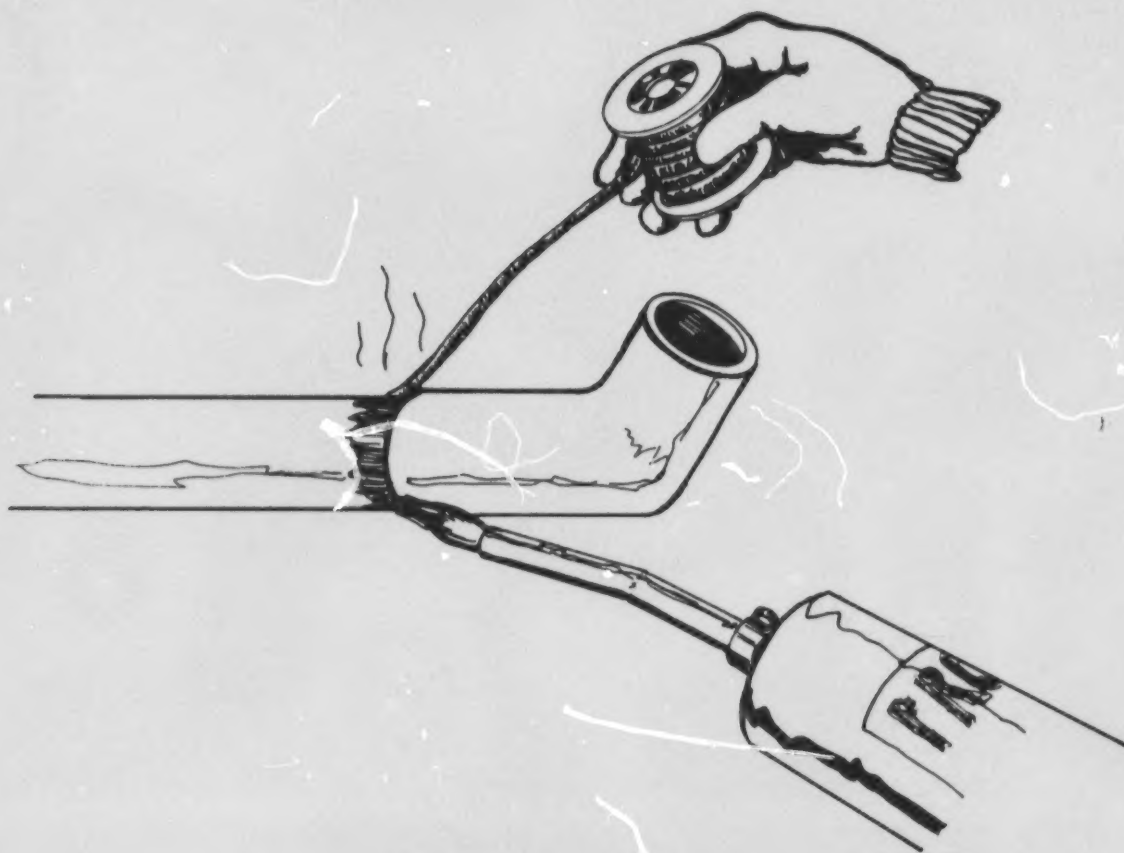
Unit 5

Soldering Pipe Connections with a Propane Torch

Introduction

Soldering is a method of joining two surfaces by using heat to melt a filler to seal the connection. Soldering is used in plumbing to join rigid copper pipes and fittings.

Your job as a plumber may require you to solder copper pipes to connect them and prevent leaking. This unit will show you how to solder copper pipe connections with a propane torch.



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Unit 5

Soldering Pipe Connections with a Propane Torch

A. Tools, Materials and Equipment for Soldering Copper Pipe Connections with a Propane Torch.

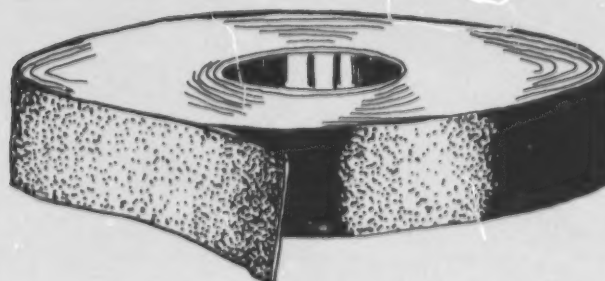
1. **PROPANE TORCH:** Supplies heat to melt solder on copper joints.



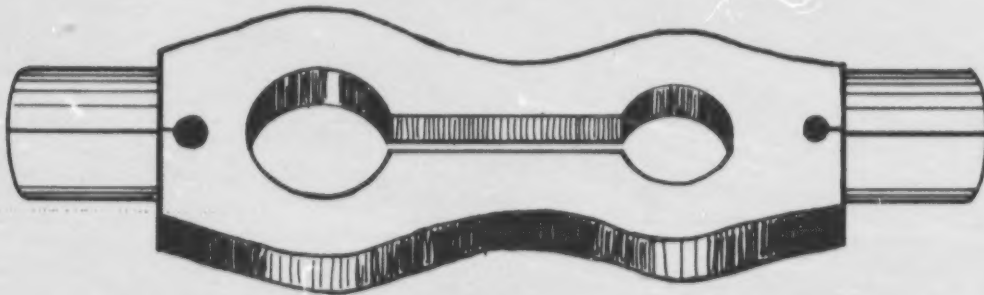
2. **SPARKLIGHTER:** Used to strike a spark and ignite propane gas.



3. **EMERY CLOTH:** Used to clean copper fitting surface.



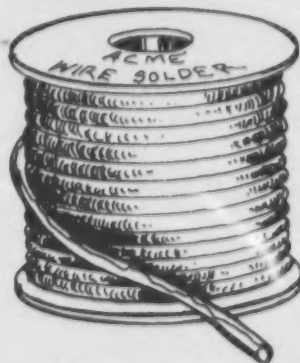
4. **CLEANING TOOL:** Used to clean inside and outside of copper tubing for soldering.



5. **SOLDERING PASTE:** Applied to copper joints to aid flow of melted solder.



6. **WIRE SOLDER:** Soft metal melted onto joints to connect and seal the joints.



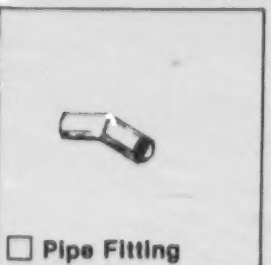
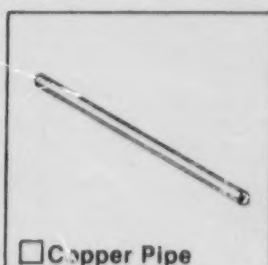
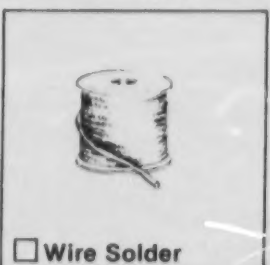
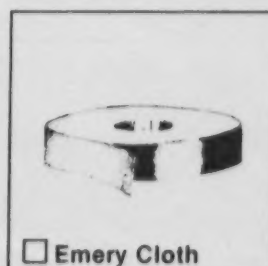
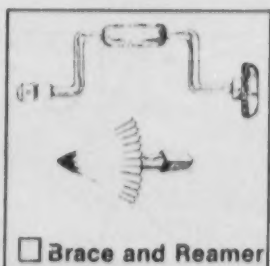
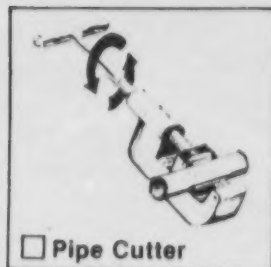
7. **SHOP TOWEL OR CLOTH:** Used to wipe off excess soldering paste, solder or dirt from copper joints.



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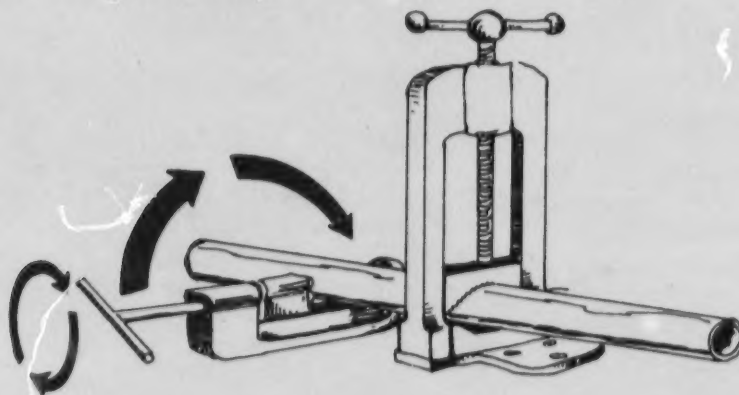
B. Steps for Soldering Copper Pipe Connections with a Propane Torch.

1. Find and Check Off the following:

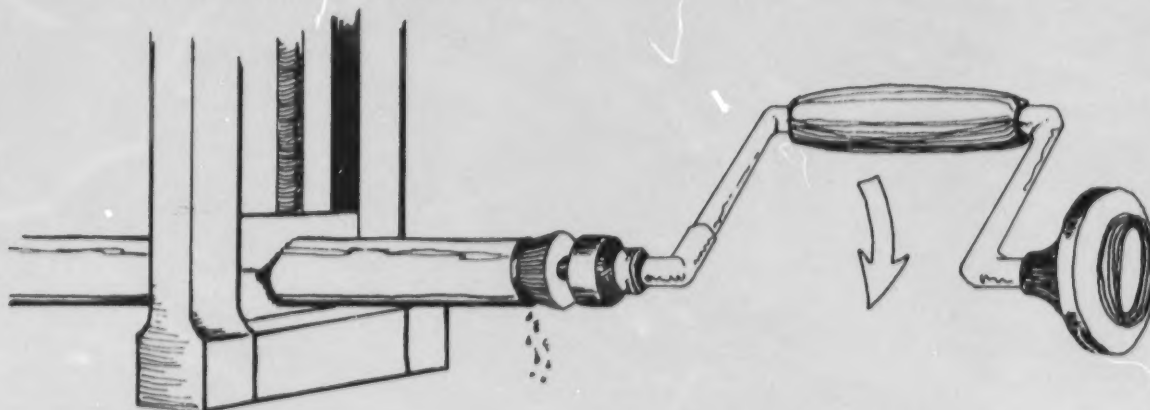


2. Wear proper safety equipment.

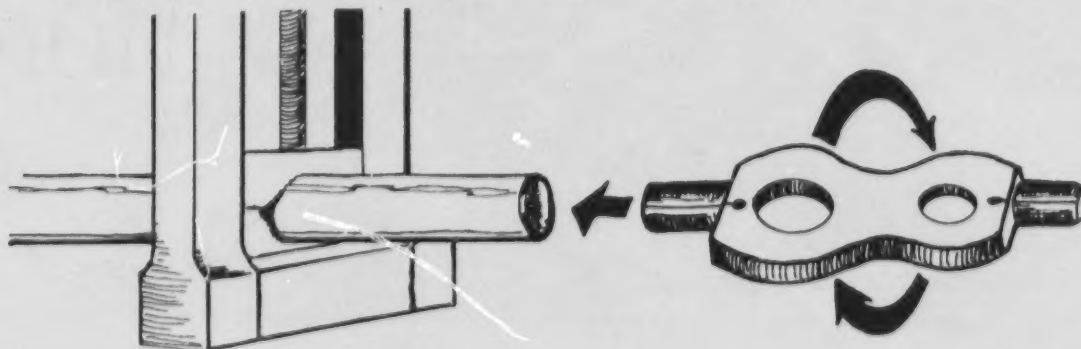
3. Secure 12" copper pipe in the pipe vise. Cut it into two 6" pieces with the pipe cutter.



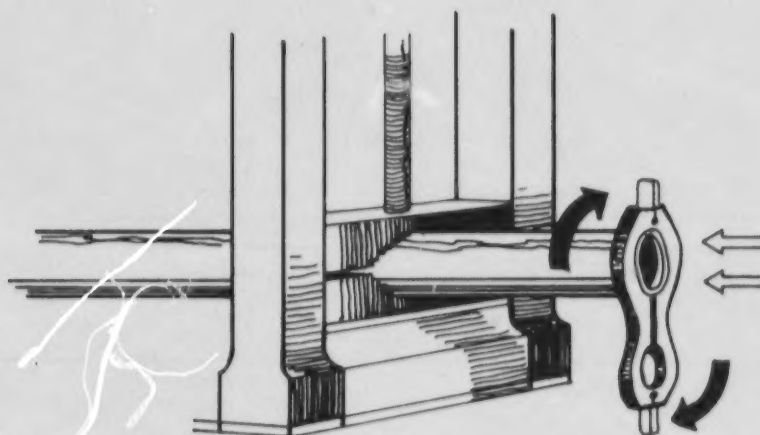
4. Ream the ends of each pipe.



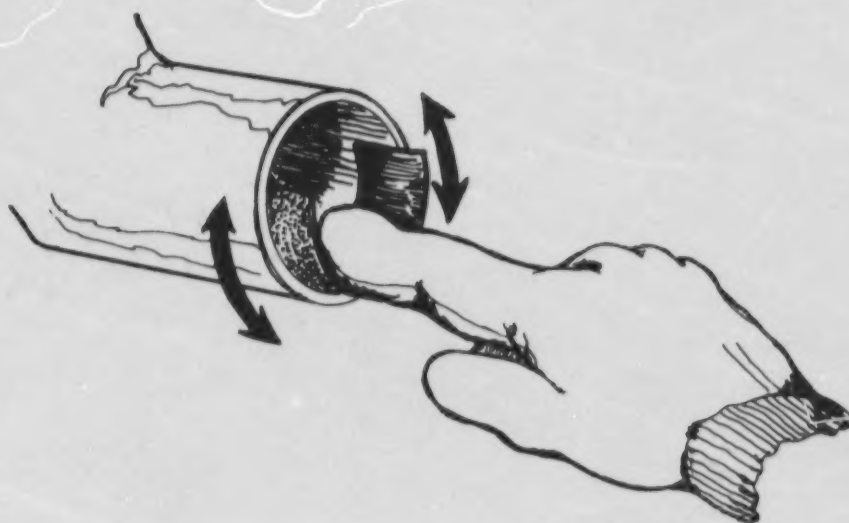
5. File the outer surface edges to remove burrs. Insert the cleaning tool into the pipe to clean the inside.



6. Fit cleaning tool around the outside to clean outer surface.



7. Clean the pipe fitting with wire brush and emery cloth.



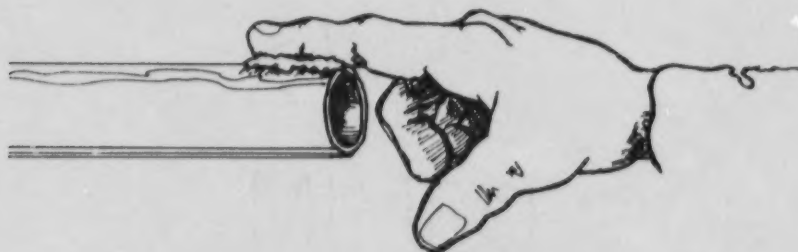
NOTE!

Be careful not to touch the cleaned metal. Your fingers can leave dirt and oil on the surface.

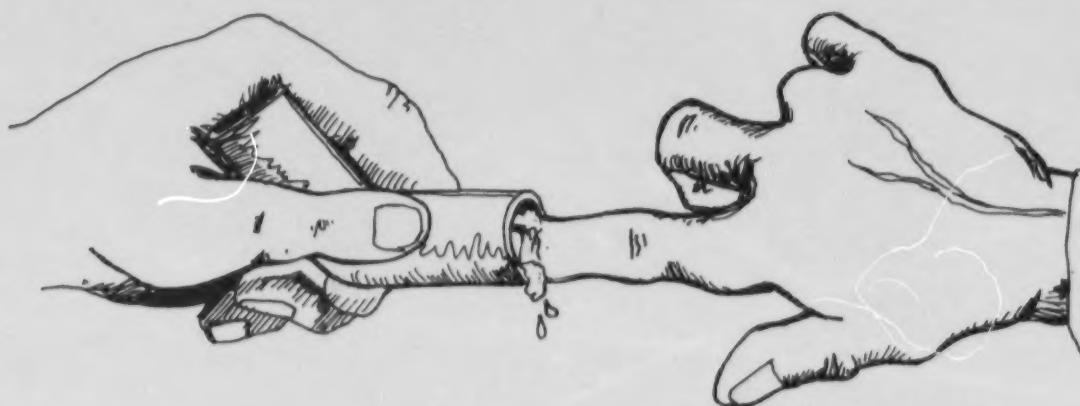
FINGERPRINT WITH DIRT
AND OIL



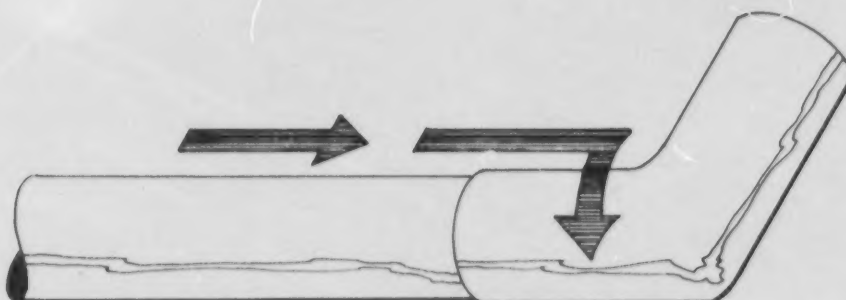
8. Apply soldering paste to the pipe.



9. Apply soldering paste to the pipe fitting.

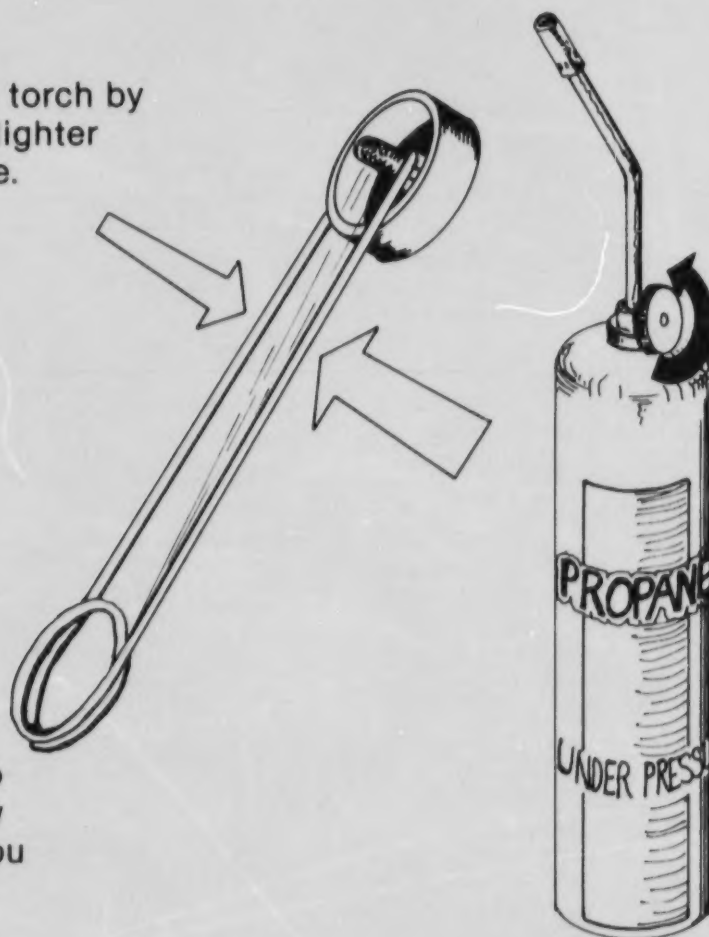


10. Push the pipe into pipe fitting. Turn pipe until it is properly aligned and tight within the pipe fitting.



11. To light the propane torch, set torch in an upright position. Turn the gas valve one-half turn to the left to open.

Light the propane torch by striking the sparklighter at the torch nozzle.



Allow the torch to warm up for a few minutes before you invert it.

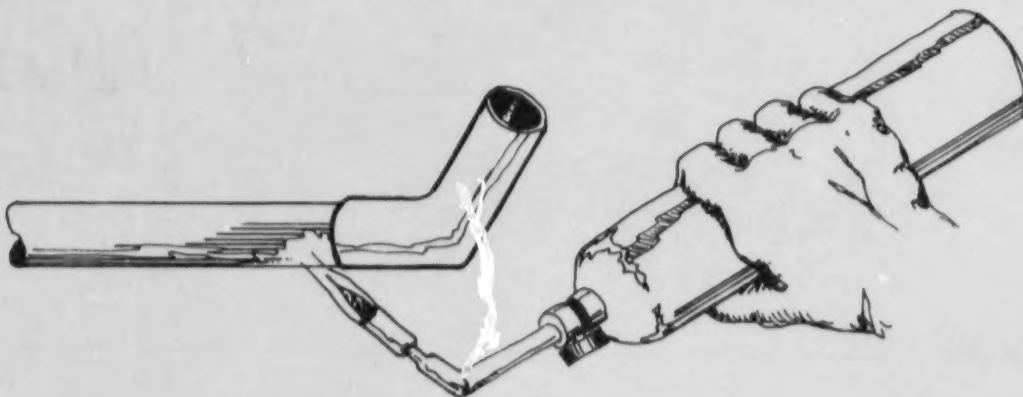
CAUTION!

ALWAYS use a sparklighter to light a propane torch.

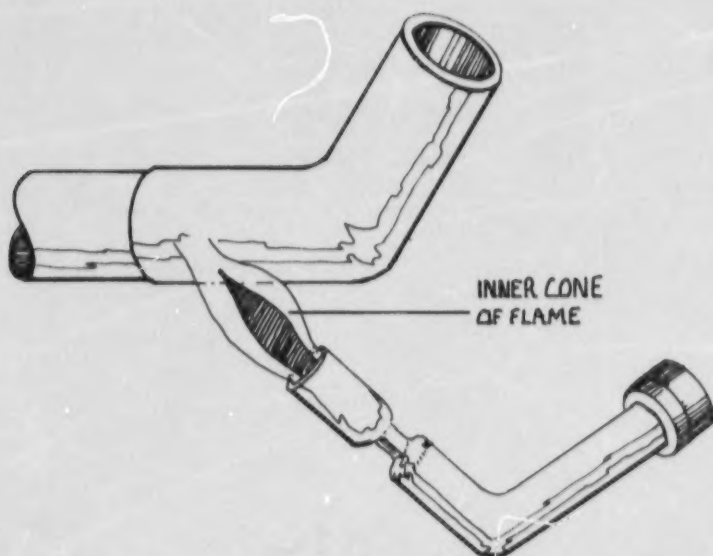
DO NOT point the lit torch at people or flammable objects.



12. Heat the copper tubing by holding the flame near the tubing.

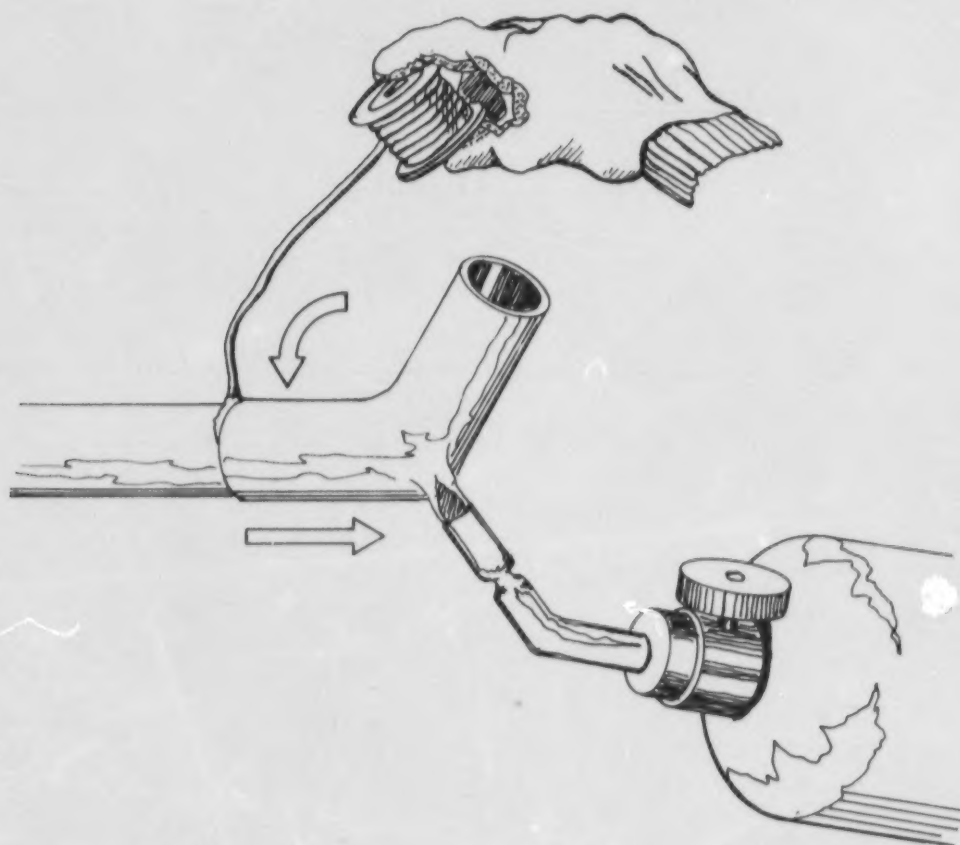


13. Heat the copper fitting. Make sure the inner cone of the flame touches the metal.



Be careful not to overheat the metal.

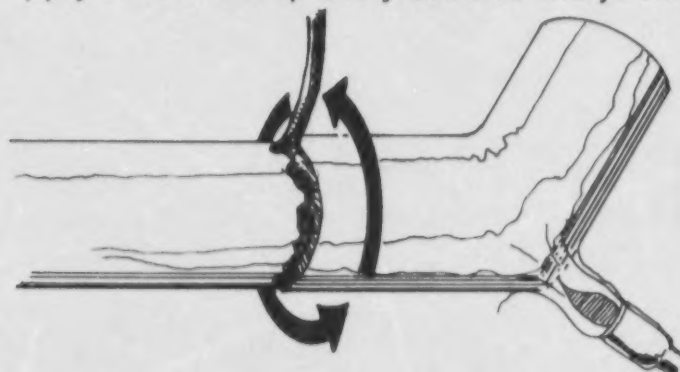
14. Touch solder slowly against heated joint. Move the torch flame to the center of fitting to maintain heat.



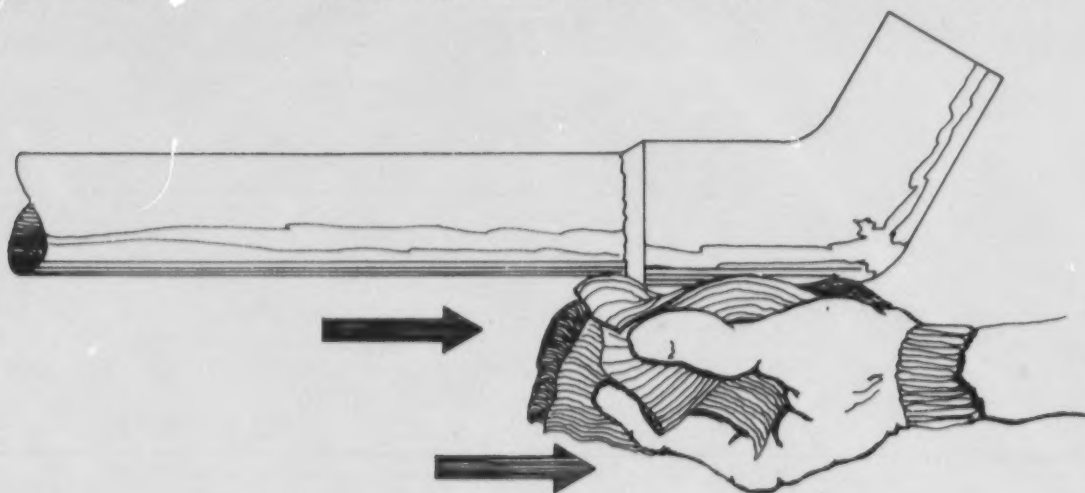
NOTE!

DO NOT melt solder with the torch flame.

15. Apply solder completely around the joint.



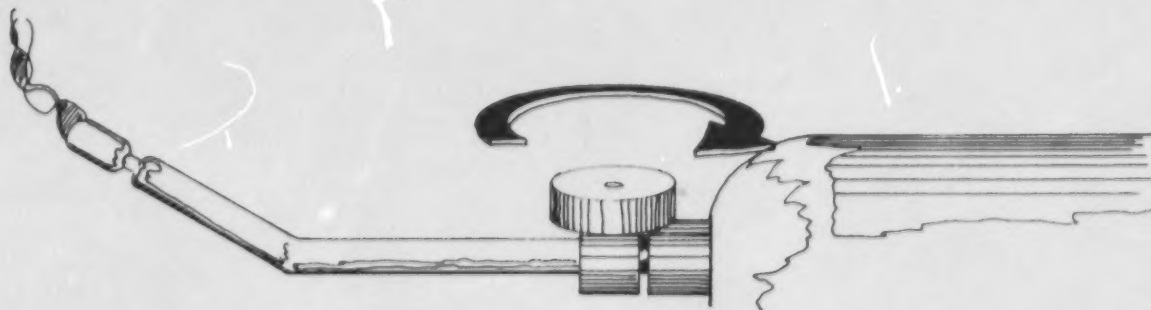
16. Wipe off any excess solder while it is still warm and pasty.



CAUTION!
NEVER touch a solder joint
with bare hands.
Hot pipes can burn you.



17. Shut off the propane torch by turning valve back to the right.



18. Clean your work area and return tools to their proper places.

SEE YOUR INSTRUCTOR

Unit 5

Soldering Pipe Connections with a Propane Torch

Tools and Materials Identification Exercise.

Match each object with its correct name.

- ___A. Propane Torch
- ___B. Sparklighter
- ___C. Emery Cloth
- ___D. Cleaning Tool
- ___E. Soldering Paste
- ___F. Wire Solder
- ___G. Shop Towel



Unit 5

Soldering Pipe Connections with a Propane Torch

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified:			
a. Propane torch			
b. Sparklighter			
c. Emery cloth			
d. Cleaning tool			
e. Solder paste			
f. Wire solder			
g. Shop towel			
2. Wore proper safety equipment.			
3. Secured pipe in vise and correctly cut pipe.			
4. Reamed the pipe ends.			
5. Filed outer edges to remove burrs.			
6. Fit cleaning tool inside and outside the pipe to clean surface.			
7. Cleaned fitting with wire brush and emery cloth.			
8. Applied soldering paste to pipe end and pipe fitting.			
9. Attached and tightened pipe into pipe fitting.			
10. Correctly lighted propane torch with sparklighter.			
11. Heated copper tubing with torch.			
12. Heated fitting with propane torch.			
13. Melted solder correctly by touching solder onto hot copper joint.			

Tasks		Yes	No	Comments
14.	Applied solder completely around the joint.			
15.	Wiped off excess solder while pipe and solder were still warm.			
16.	Shut off propane torch.			
17.	Cleaned work area and replaced tools properly.			

Satisfactory Performance ☐

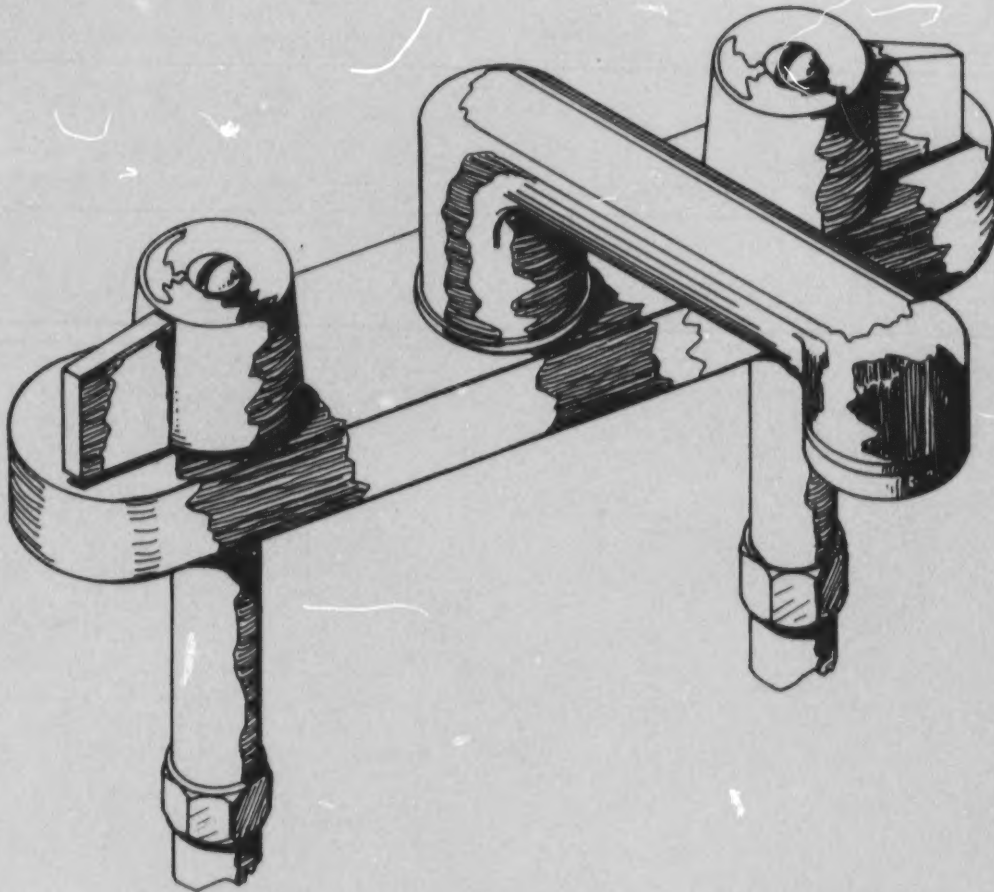
Repeat Exercise ☐

Should Move On ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 6

Making a Flare Joint

Developed by: Hogan Usoro

Unit 6

Making a Flare Joint

Making a Flare Joint

After you have studied this lesson, you should be able to:

1. Identify tools and materials used in making a flare joint.
2. Make a flare joint.

Show What You Can Do.

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



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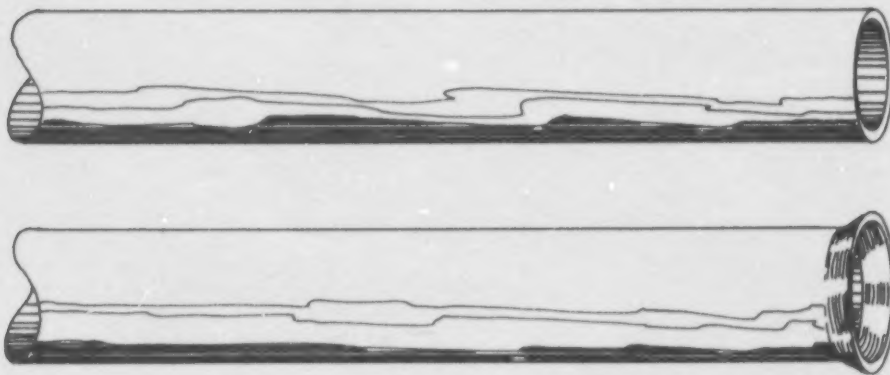
Unit 6

Making a Flare Joint

Introduction

You have learned how to solder a copper pipe to a pipe fitting. Another method of making a copper pipe joint is to flare the pipe end. Flaring a pipe makes the pipe end bell shaped. This allows another piece of copper pipe to be fitted into the flared end, then soldered.

Flare joints are used to connect underground water supply pipes.

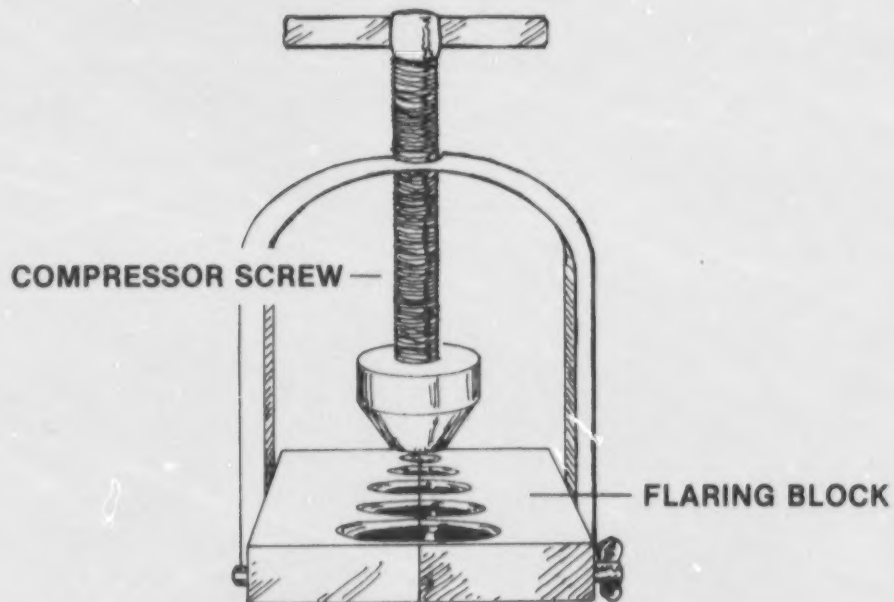


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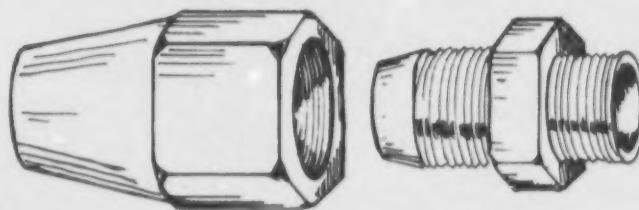
Unit 6 Making A Flare Joint

A. Tools, Materials and Equipment for Making a Flare Joint.

1. **FLARING TOOL:** Used to expand end of copper tube.



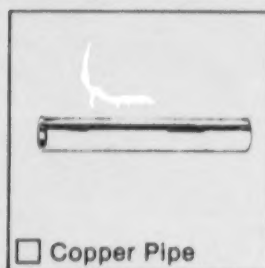
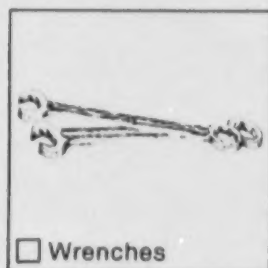
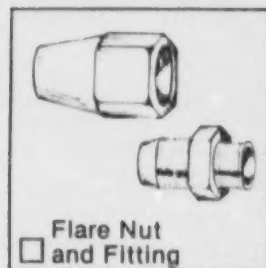
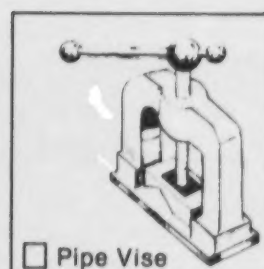
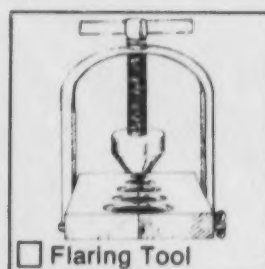
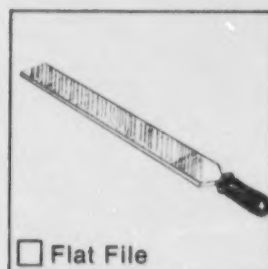
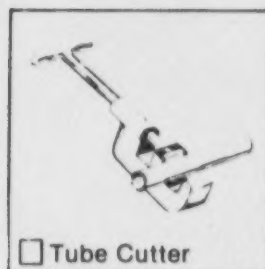
2. **FLARE NUT AND FITTING:** Attaches to flared end of cut copper tubing and acts as a connector for other pieces.



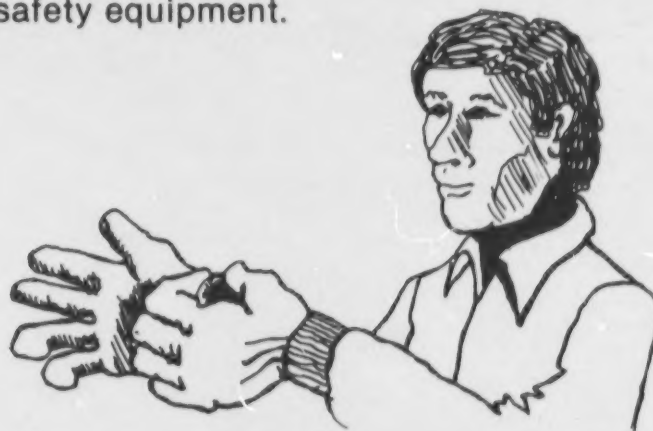
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B. Steps for Making a Flare Joint.

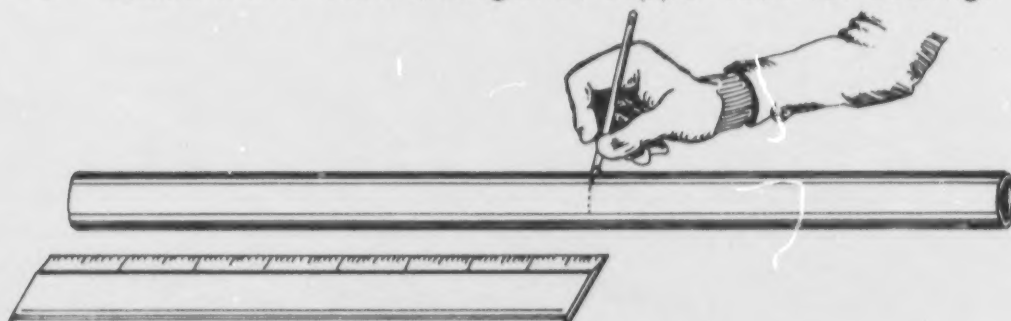
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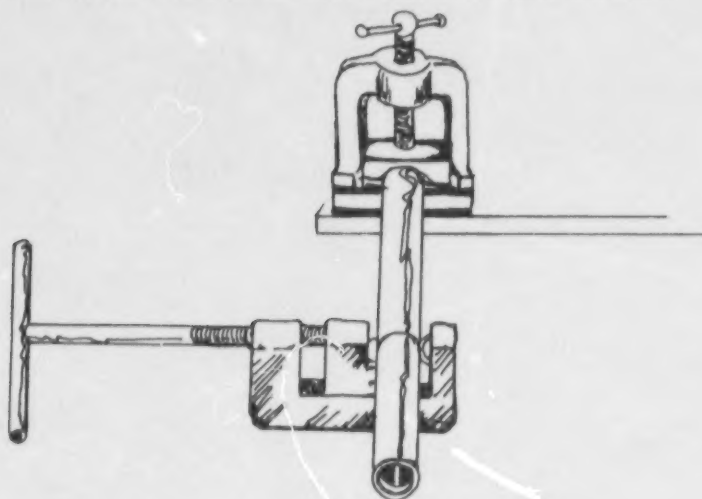
2. Wear proper safety equipment.



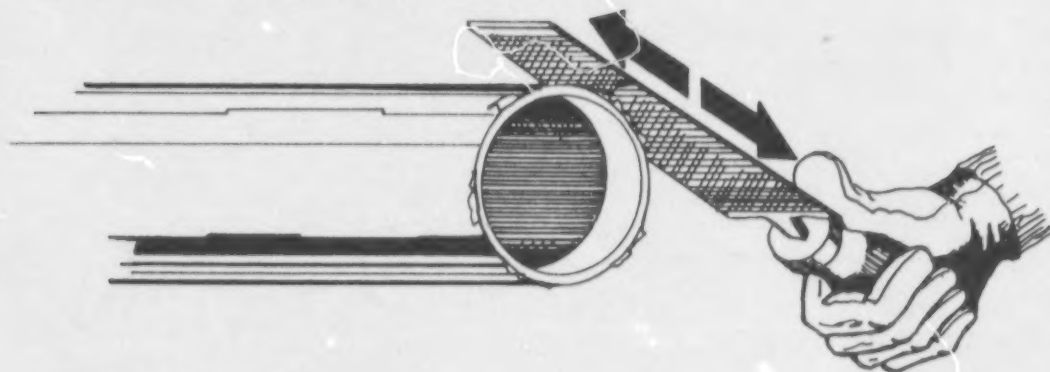
3. Measure and mark a length of copper tube for cutting.



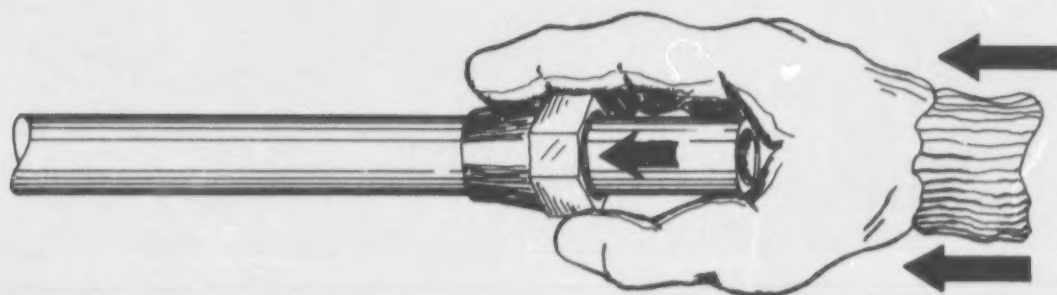
4. Secure tube in pipe vise and cut it with tube cutter.



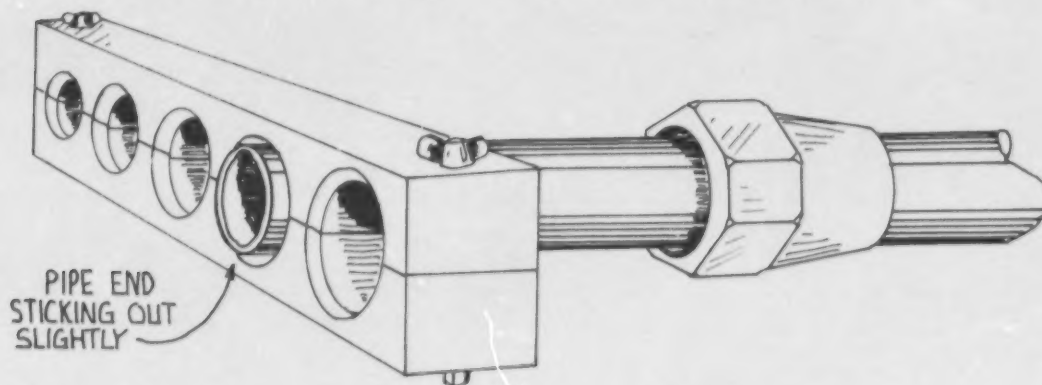
5. File burrs from cut end of tube.



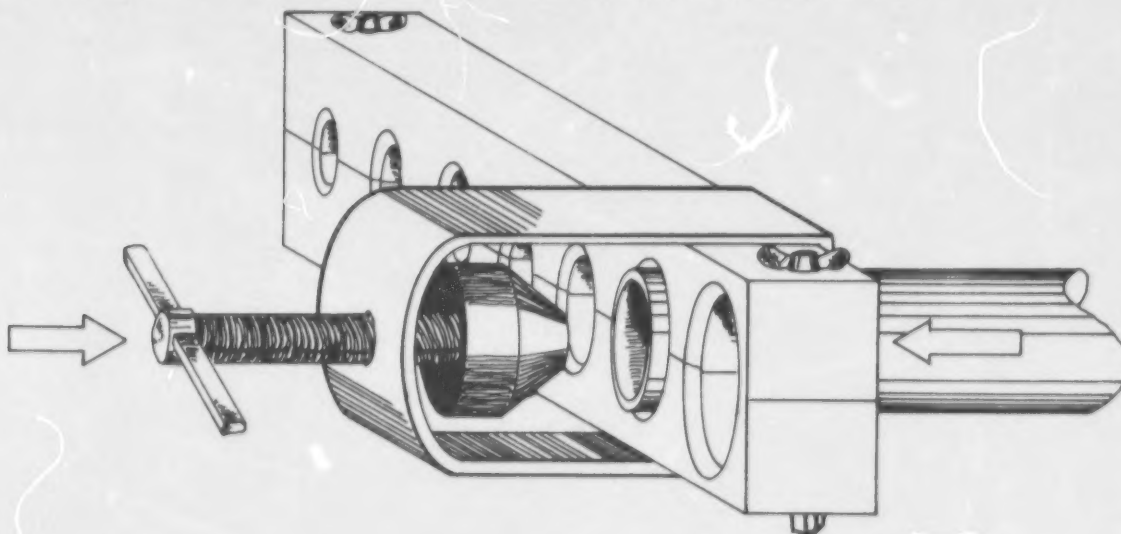
6. Slip the flare nut over cut end of tube.



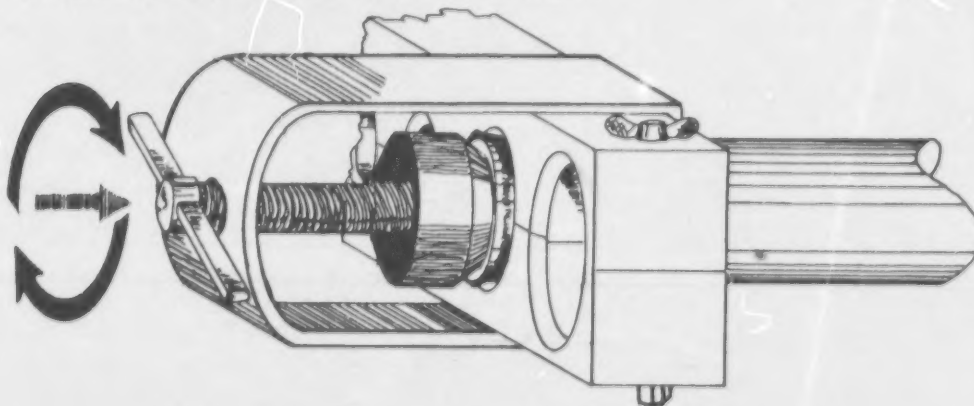
7. Clamp copper tube in the flaring block part of the flaring tool. Position tube end slightly above face of the block.



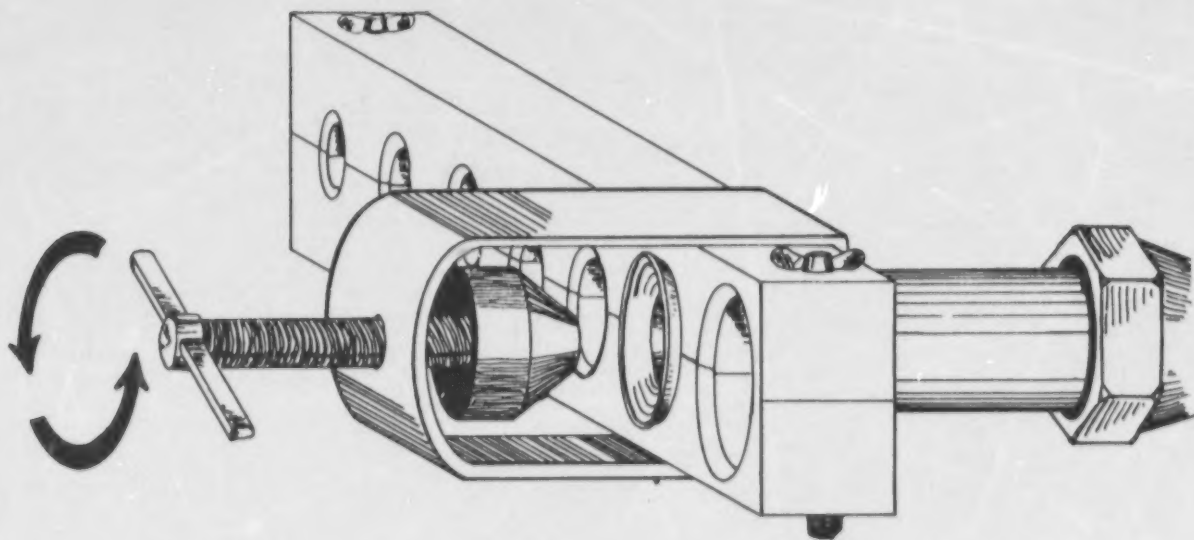
8. Align flaring tool above end of pipe on flaring block.



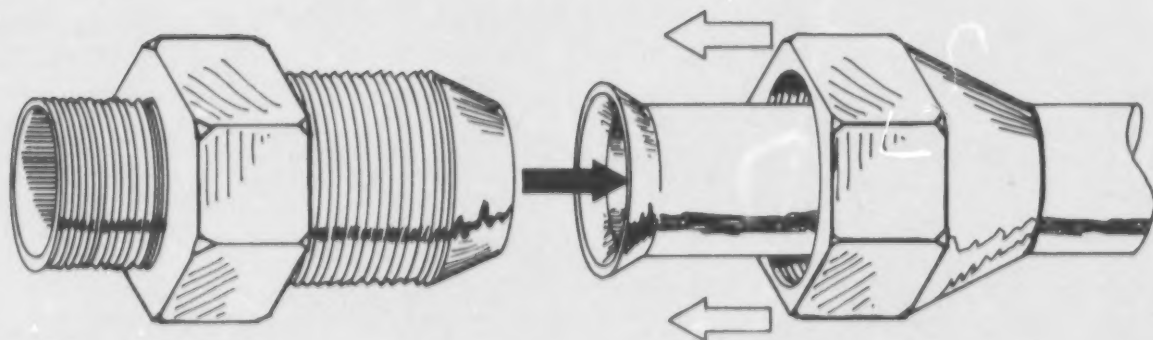
9. Tighten the compressor screw onto the copper tube. Apply pressure until flared end is formed.



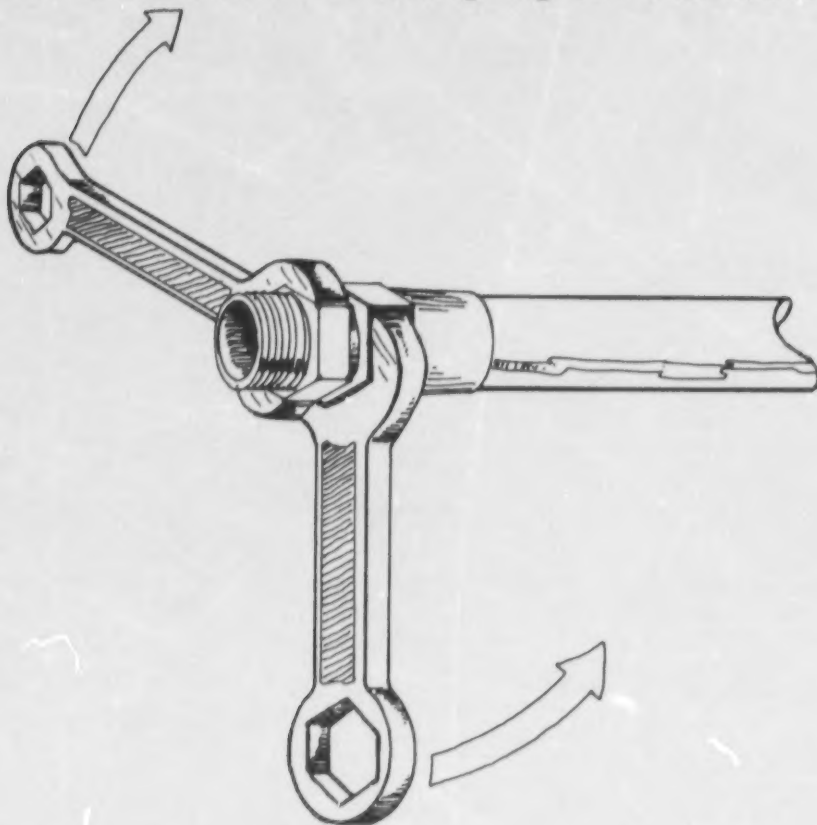
10. When flared end is formed, unscrew compressor screw and release copper tube from flaring block.



11. Place the flare fitting squarely against and inside flared end.



12. Thread flare nut onto flare fitting. Tighten with wrenches.



13. Have your instructor examine your work.



14. Return tools to their proper places.

SEE YOUR INSTRUCTOR

Unit 6

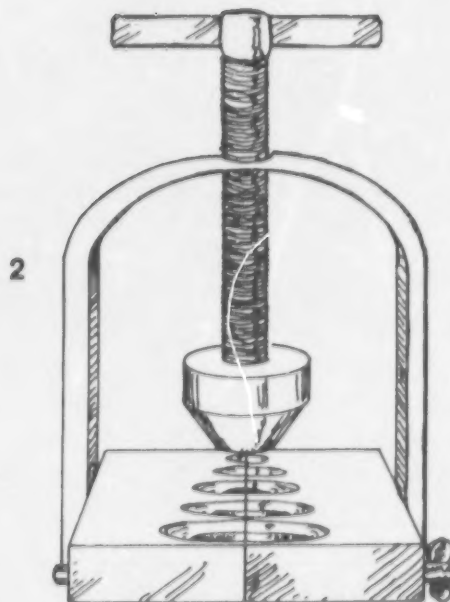
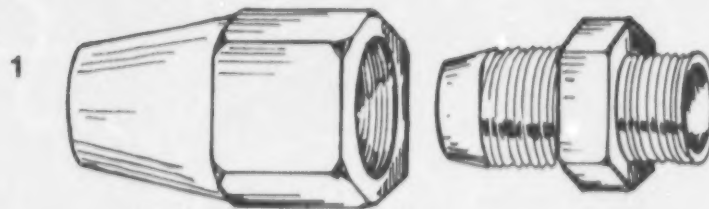
Making a Flare Joint

Tools and Materials Identification Exercise

Match each tool with its correct name.

___A. Flaring Tool

___B. Flare Fitting and Nut



Unit 6 Making a Flare Joint

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified:			
a. Flaring tool			
b. Flaring fitting and nut			
2. Wore proper safety equipment.			
3. Measured and marked correct length of tube.			
4. Secured tube in vise and cut pipe.			
5. Filed burrs from cut end of tube.			
6. Correctly placed copper tube in flaring block.			
7. Aligned flaring tool with copper tube on block.			
8. Tightened compressor screw until flared end was formed.			
9. Loosened compressor screw and removed tube from block.			
10. Correctly placed fitting against flared end.			
11. Threaded flaring nut onto flare fitting and tightened with wrenches.			
12. Had instructor check work.			
13. Returned tools to proper places.			

Satisfactory Performance ☐

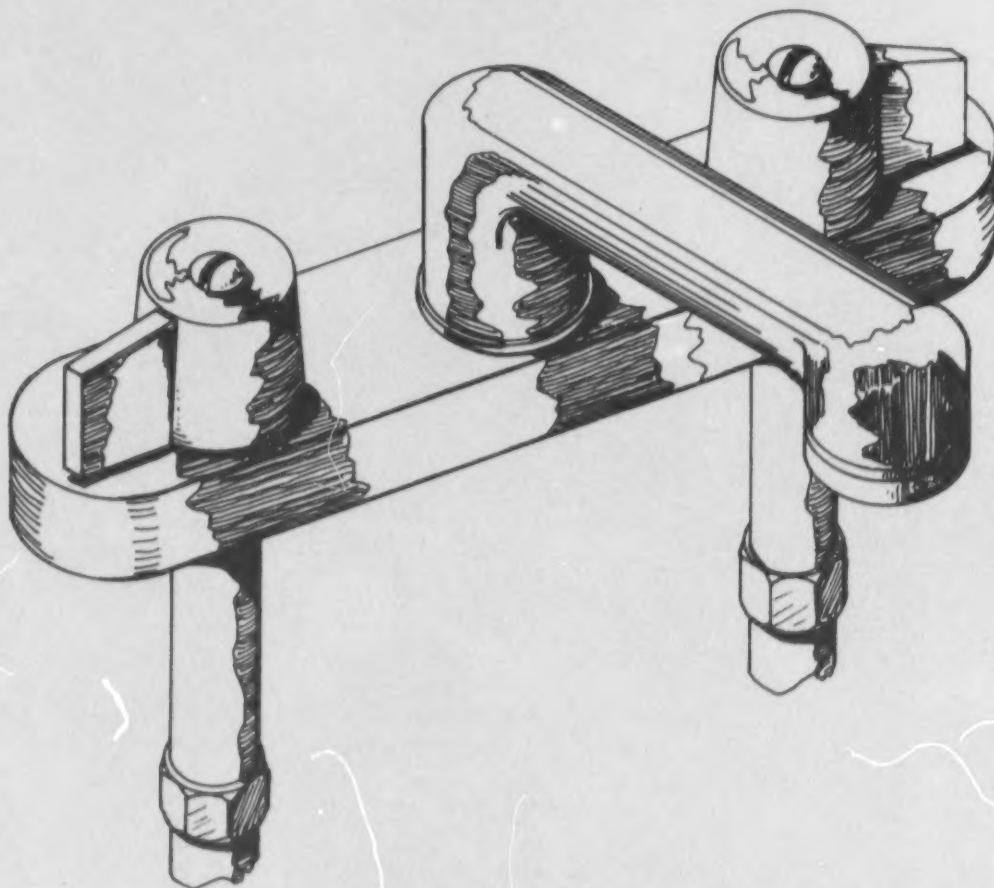
Repeat Exercise ☐

Should Move On ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 7

Making a Plastic Pipe Joint

Developed By: Hogan Usoro

Unit 7

Making a Plastic Pipe Joint

Making a Plastic Pipe Joint

After you study this lesson, you should be able to:

1. Identify tools and materials used to make a plastic pipe joint.
2. Join plastic pipe by using solvent.

Show What You Can Do.

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



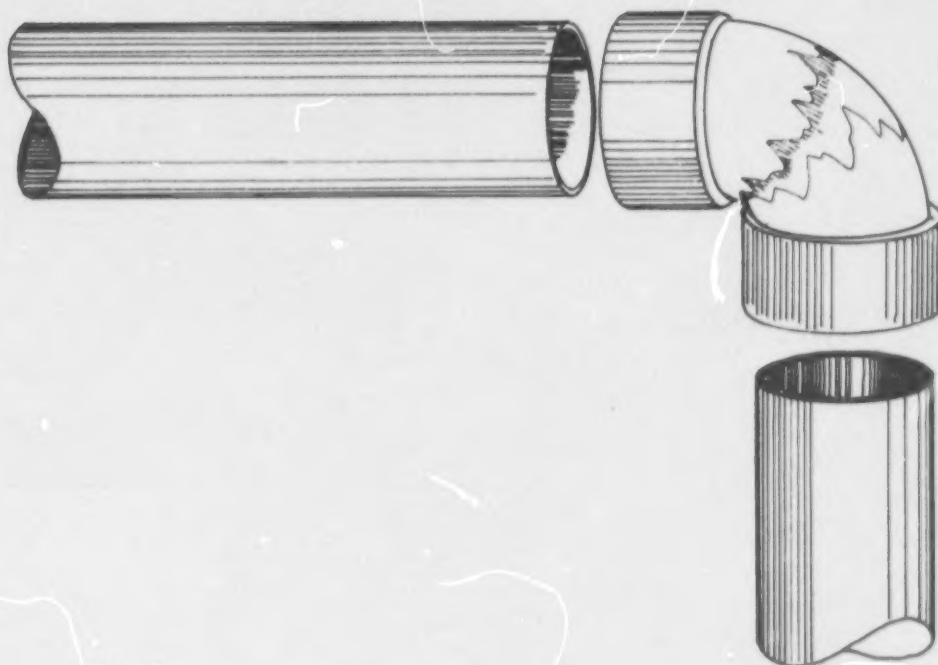
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Unit 7 Making a Plastic Pipe Joint

Introduction

Plastic pipes are widely used in plumbing. They are light weight and easy to install. Plastic pipes can be used underground and in buildings.

Making joints with plastic pipes is different from making joints with copper tubing. In this unit you will learn how plastic pipes are joined for plumbing work.



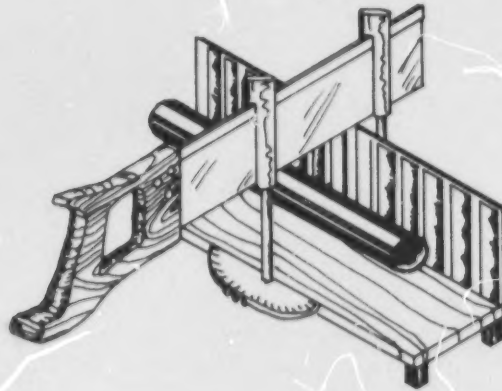
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Unit 7

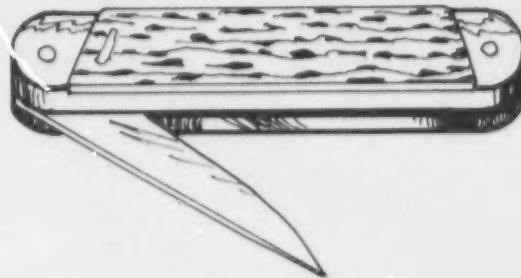
Making a Plastic Pipe Joint

A. Tools, Materials and Equipment for Making a Plastic Pipe Joint.

1. **MITER BOX AND SAW:** Used to cut plastic pipe to desired angle.



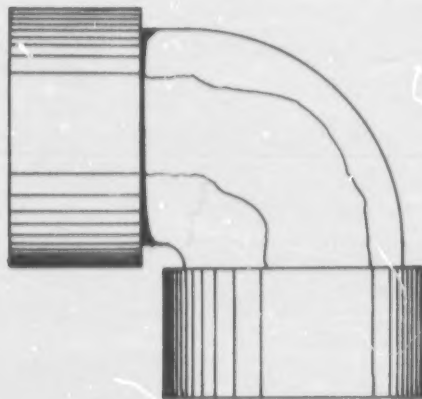
2. **POCKET KNIFE:** Used to remove burrs from cut end of plastic pipe.



3. **PIPE SOLVENT:** Cement used to seal plastic pipe joints.



4. **PLASTIC FITTING:** Used to connect separate pieces of pipe.



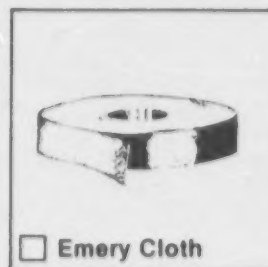
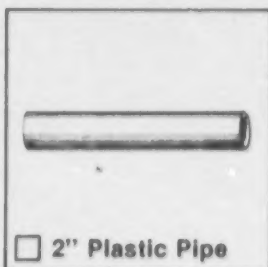
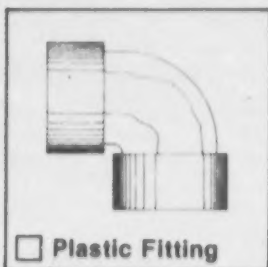
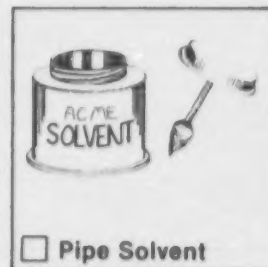
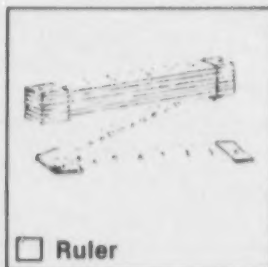
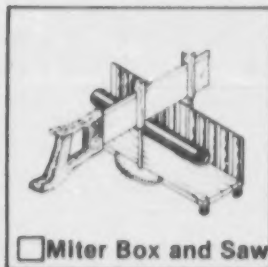
5. **TWO-INCH PLASTIC PIPE:** Two foot section of pipe to be cut and jointed.



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B. Steps for Making a Plastic Pipe Joint.

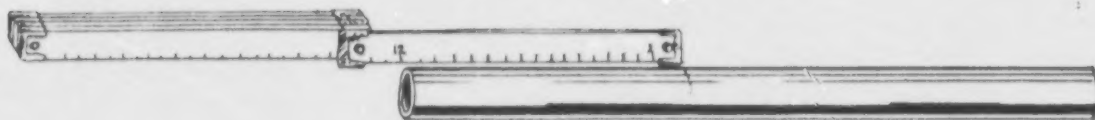
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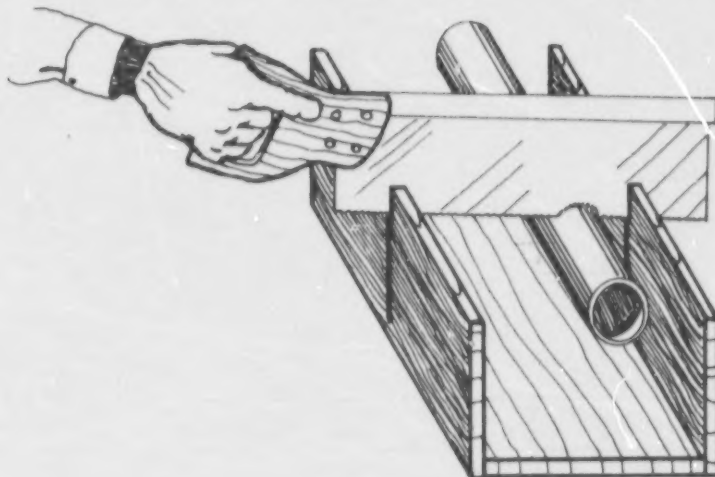
2. Wear proper safety equipment.



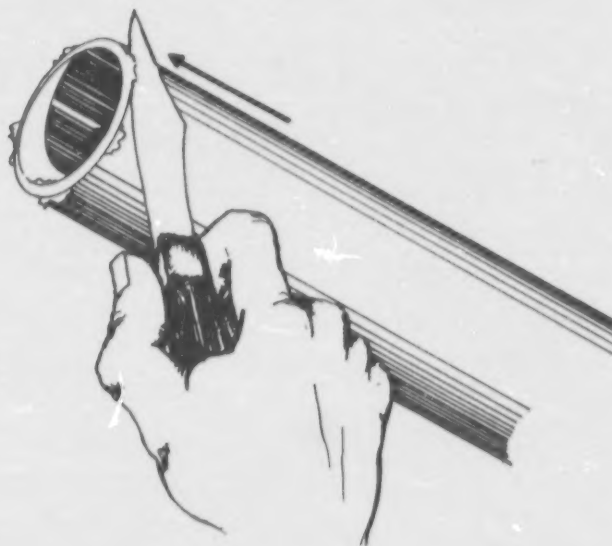
3. Measure a 12-inch section on the 2" pipe and mark it.



4. Secure plastic pipe in miter box and cut at the 12-inch mark.



5. Trim burrs from cut end of plastic pipe.



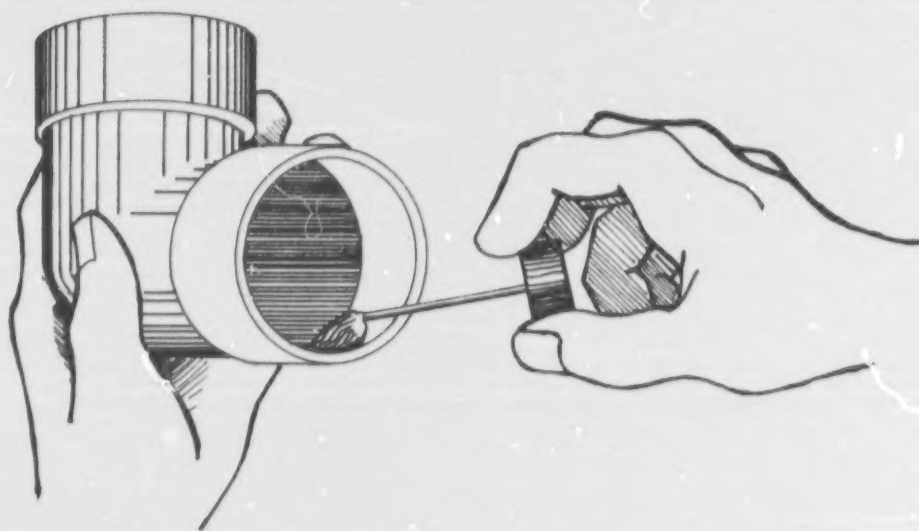
6. Use emery cloth to clean outside surface of cut end of pipe and inside surface of plastic fitting.



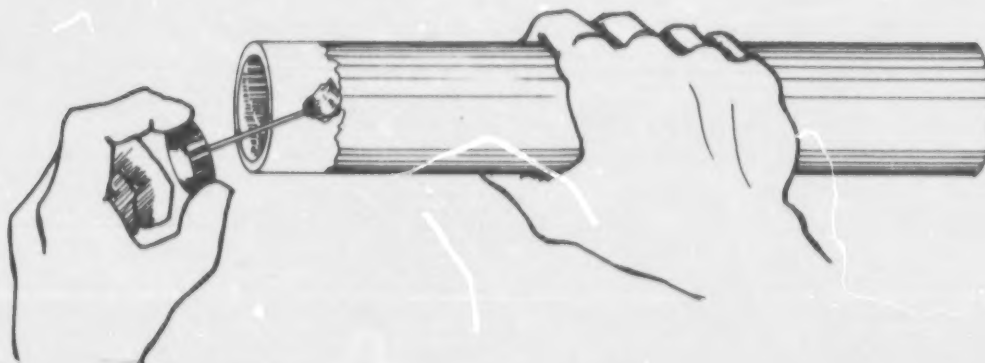
NOTE!

If solvent has cleaner with it, apply with a shop towel or clean cloth.

7. Apply solvent quickly to the inside of the fitting.

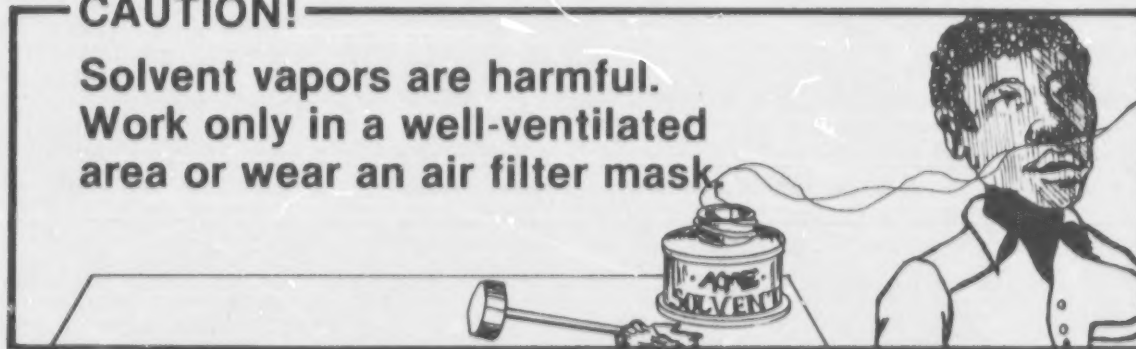


8. Quickly apply a heavy coat of solvent to the outside of pipe end.

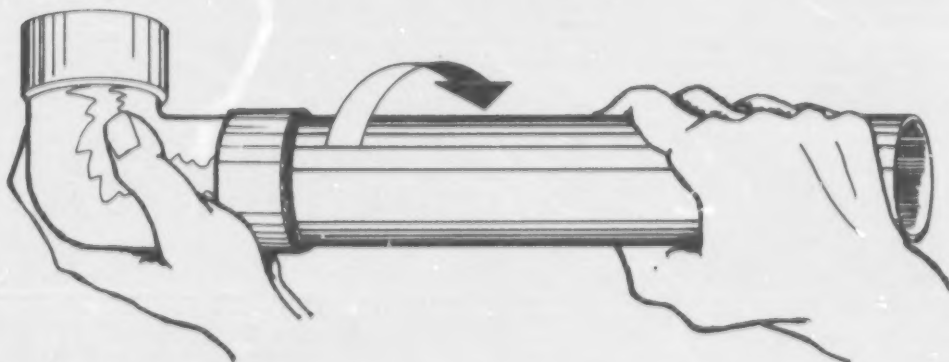


CAUTION!

Solvent vapors are harmful.
Work only in a well-ventilated
area or wear an air filter mask.



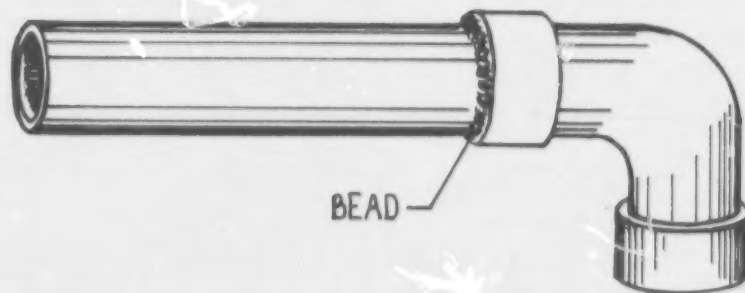
9. Insert pipe into fitting while solvent is wet. Turn it 1/4 turn to spread the solvent between the two surfaces.



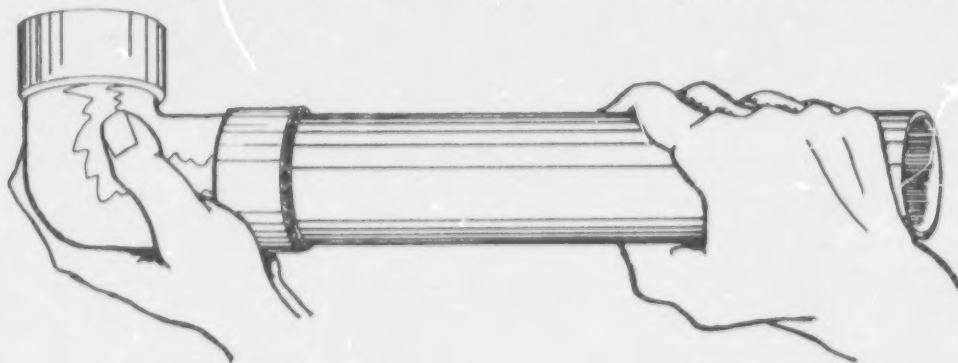
Be sure the pipe and fitting are properly aligned.

NOTE!

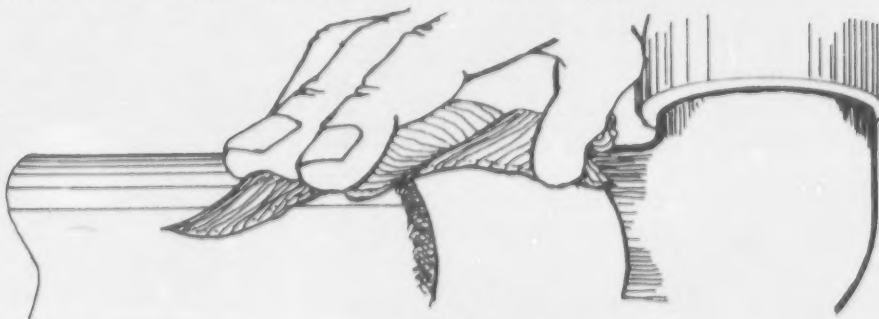
A continuous bead around the fitting is necessary to prevent the joint from leaking.



10. Hold joint firmly for about one minute to allow solvent to set.



11. Wipe off excess solvent with shop towel.



12. Wash your hands.

13. Clean your work area. Return tools to proper places.

SEE YOUR INSTRUCTOR

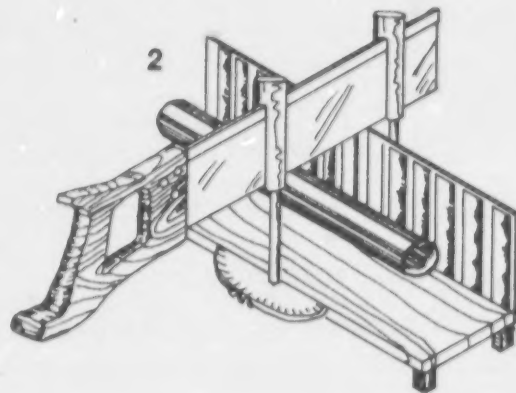
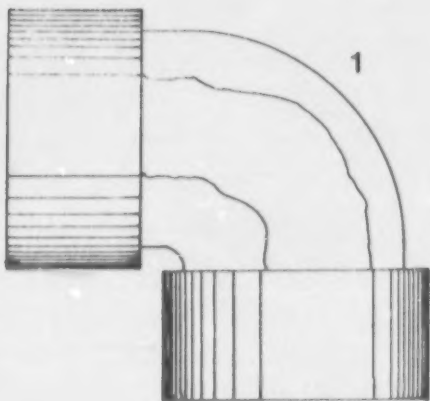
Unit 7

Making a Plastic Pipe Joint

Tools and Materials Identification Exercise

Match each object with its correct name.

- ___ A. Miter Box and Saw
- ___ B. Plastic Pipe Solvent
- ___ C. Plastic Pipe Fitting
- ___ D. Two-inch Plastic Pipe



Unit 7 Making a Plastic Pipe Joint

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified			
a. Miter box and saw			
b. Plastic pipe solvent			
c. Plastic pipe			
d. Plastic pipe fitting			
2. Wore proper safety equipment.			
3. Measured and marked pipe.			
4. Correctly used miter box and saw to cut plastic pipe.			
5. Removed burrs and cleaned pipe end.			
6. Quickly applied solvent to inside of pipe fitting.			
7. Quickly applied solvent to outside of pipe end.			
8. Inserted pipe into fitting and twisted to spread solvent.			
9. Aligned pipe and fitting and held until solvent set.			
10. Wiped off excess solvent.			
11. Washed hands.			
12. Cleaned work area and returned tools to proper places.			

Satisfactory Performance ☐

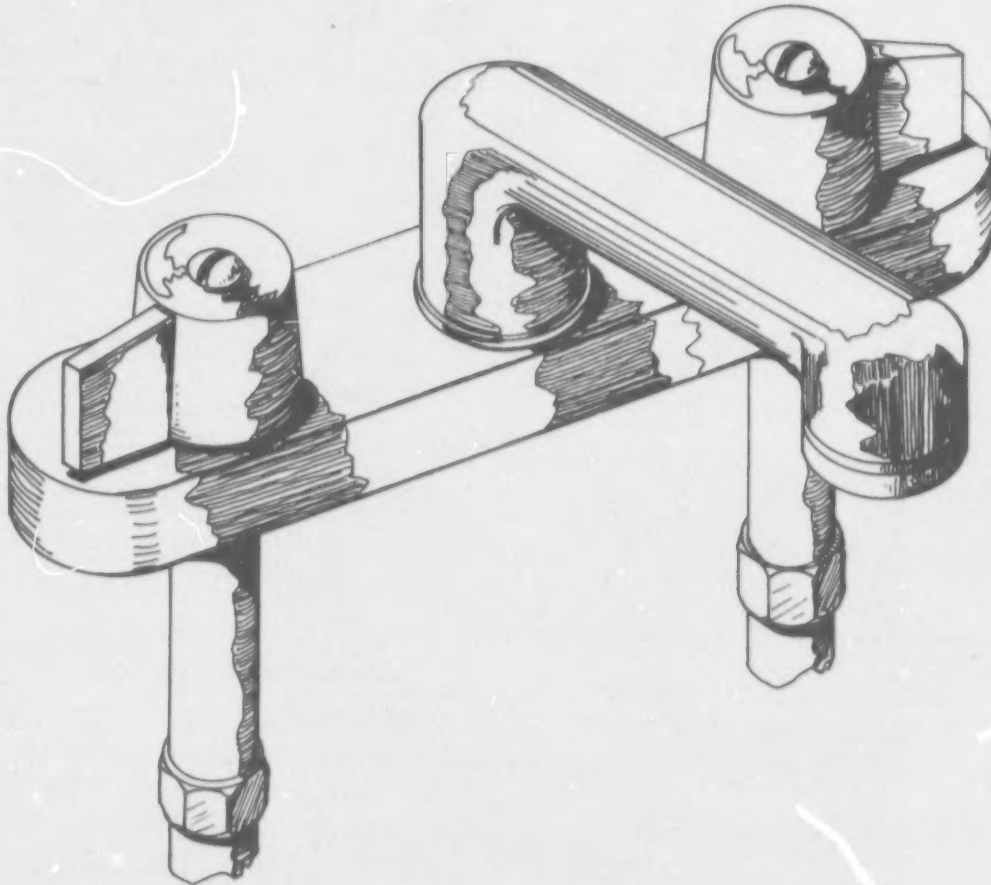
Should Move On ☐

Repeat Exercise ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 8

Repairing Faucets

Developed By: Hogan Usoro

Unit 8 Repairing Faucets

Repairing Faucets

After you study this lesson, you should be able to:

1. Identify tools and materials used to repair leaky faucets.
2. Identify different types of faucets.
3. Repair different types of faucets.

Show What You Can Do

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



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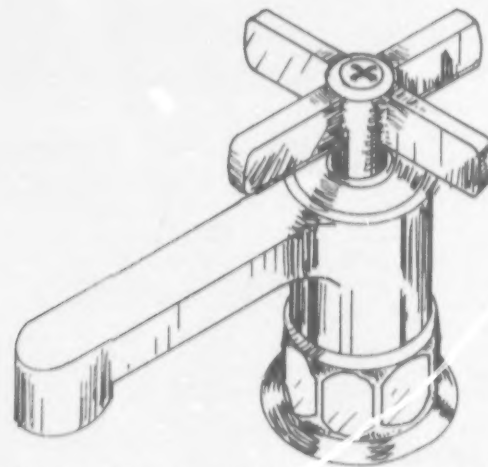
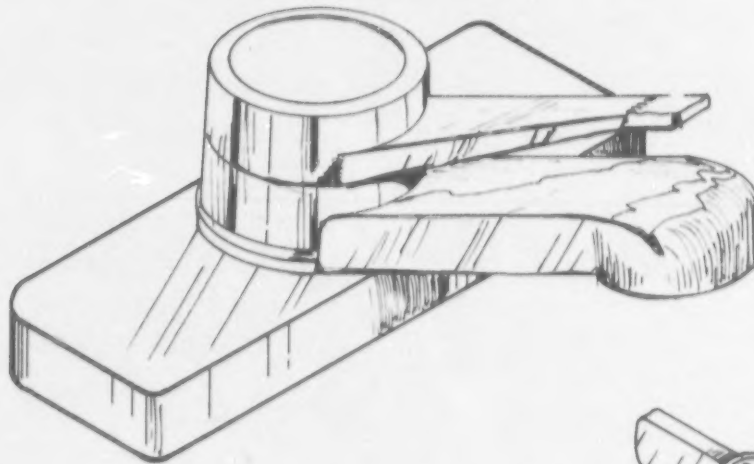
Unit 8 Repairing Faucets

Introduction

Household faucets start leaking because of two reasons; the valve seat washer no longer fits properly, or the packing around the spindle is worn. Both problems are simple to repair.

This unit will show you different types of faucets and how to repair them.

WASHERLESS FAUCET



SINGLE-HANDLE WASHER-TYPE FAUCET

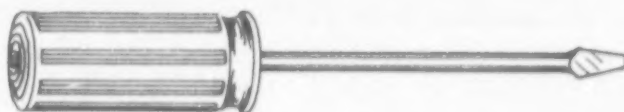
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Unit 8

Repairing Faucets

A. Tools, Materials and Equipment for Repairing Leaky Faucets.

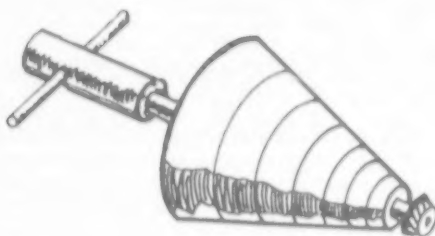
1. **STANDARD SCREWDRIVER:** Used to remove screw from certain faucet handles.



2. **PHILLIPS SCREWDRIVER:** Used to remove screw from faucets with Phillips screw heads.



3. **SEAT DRESSING TOOL:** Used to smooth the valve seat surface in a faucet.



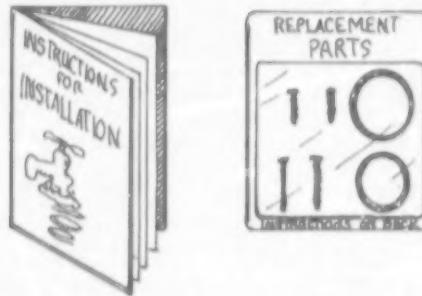
4. **WRENCH:** Used to tighten or remove packing nut on faucet. A packing nut holds the faucet handle in position.



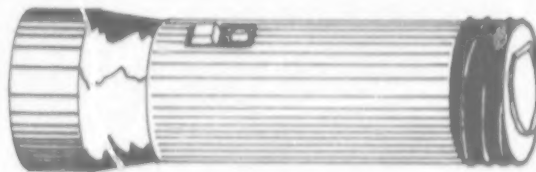
5. **PACKING WASHERS OR O-RINGS:** Used to replace worn seals in faucet.



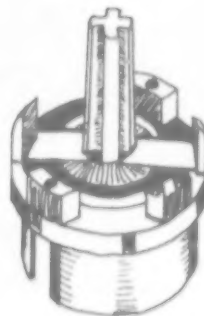
6. **MANUFACTURER'S INSTRUCTIONS:** Used to install particular replacement parts in a faucet.



7. **FLASHLIGHT:** Provides light in dark places when doing plumbing work.



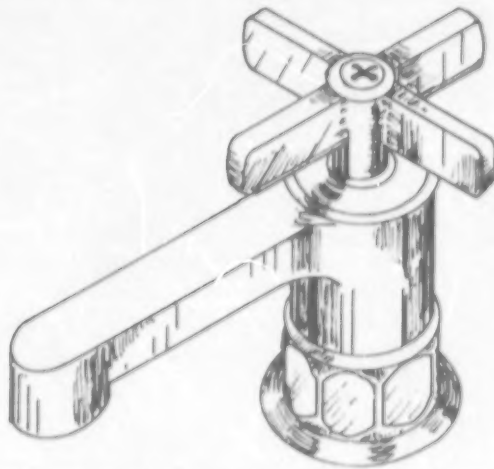
8. **DISK-VALVE FAUCET ASSEMBLY:** Replacement part for washerless faucet.



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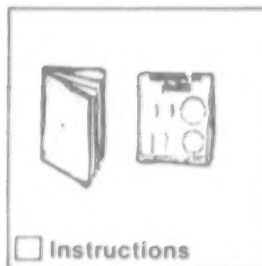
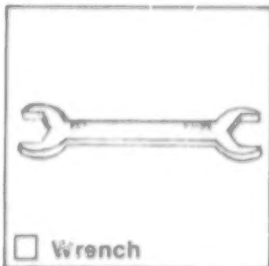
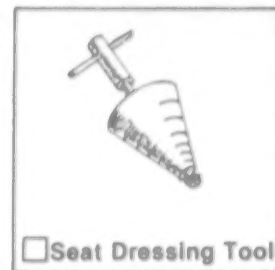
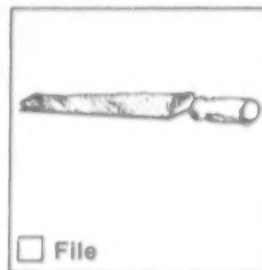
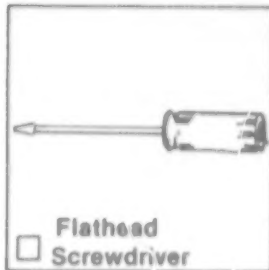
Unit 8 Repairing Faucets

B. Steps for Repairing a Washer-Type Faucet.



SINGLE-HANDLE WASHER-TYPE FAUCET

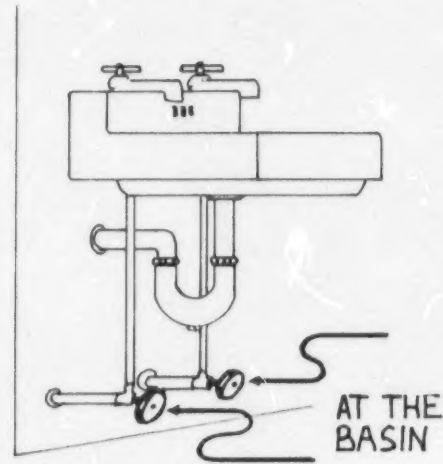
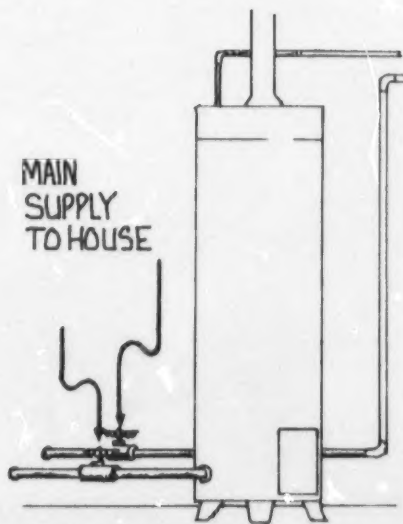
1. Find and Check Off the following:



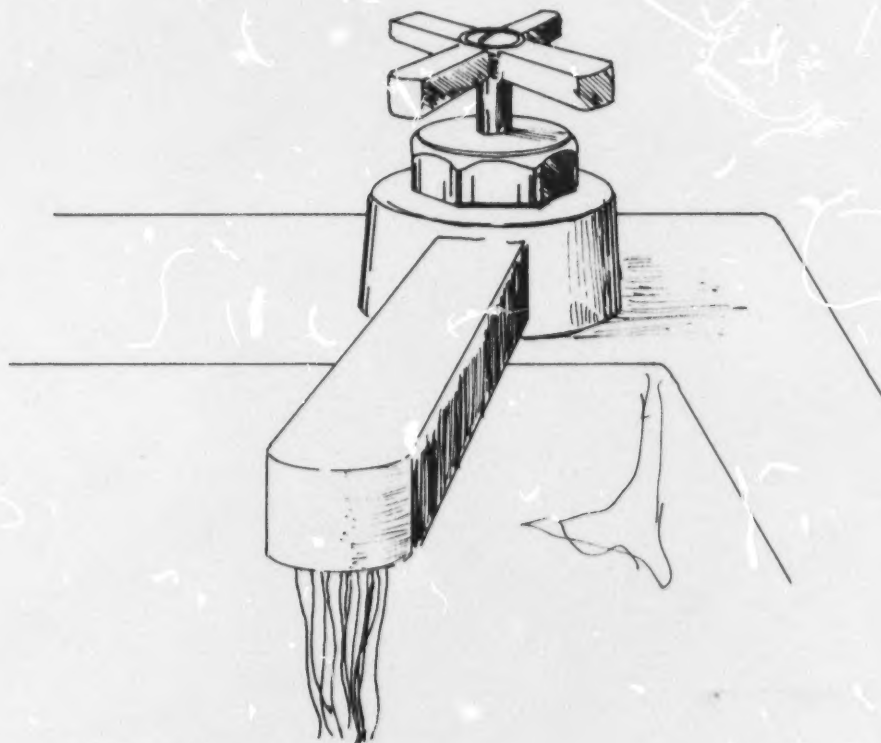
2. Wear proper safety equipment.



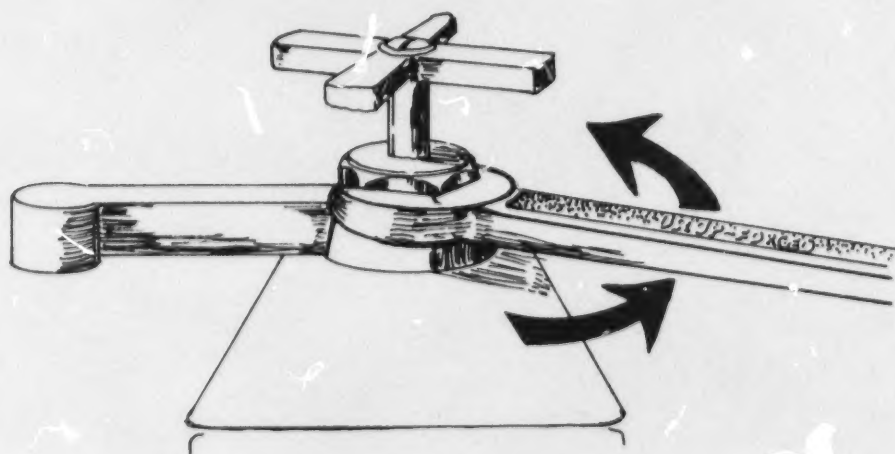
3. Locate the water supply line to the faucet and shut it off.



4. Open faucet and allow water to drain from the line.



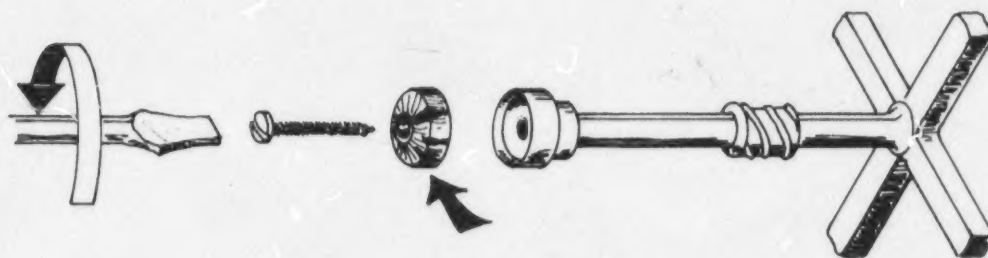
5. Loosen the packing nut on the faucet.



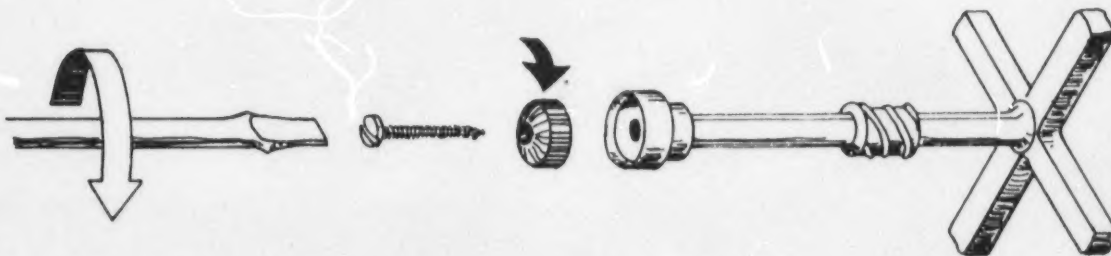
6. When packing nut is loose, lift the handle to remove the faucet stem.



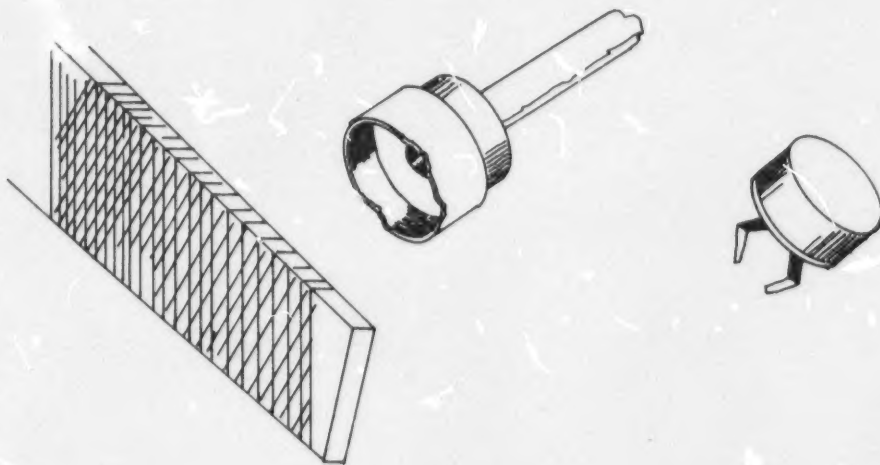
7. Remove the screw holding the washer in place if washer is bad.



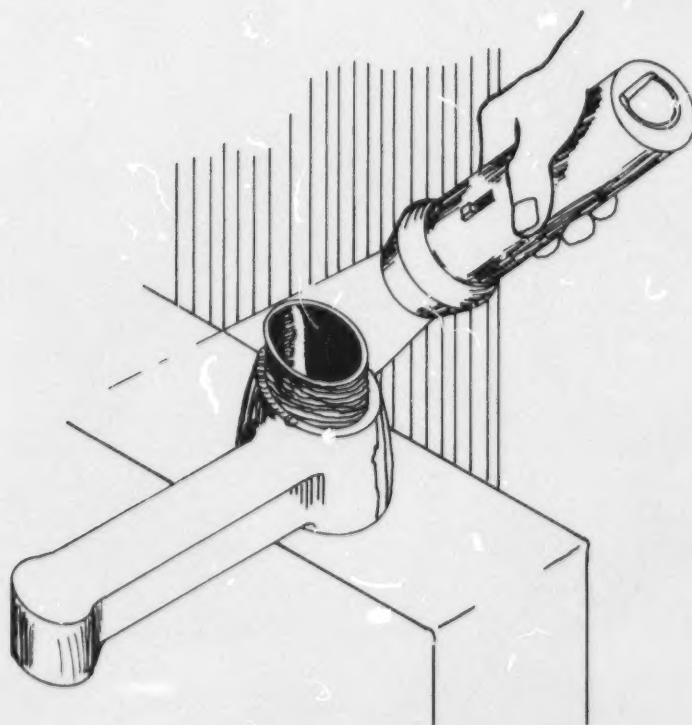
8. Check the rim at the stem end. If rim is in good condition, install a new washer.



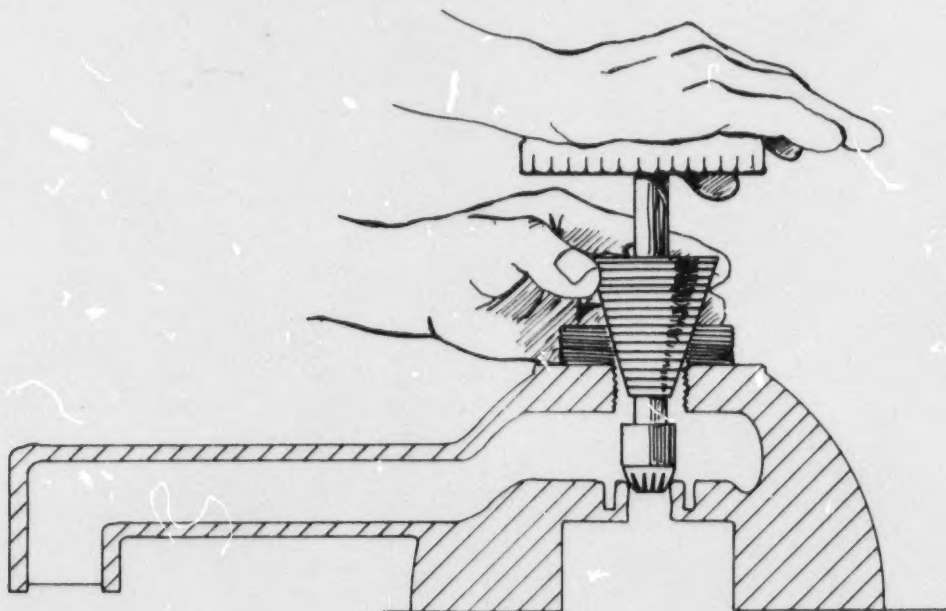
9. If rim is worn or rough, file the rim smooth and use appropriate type of washer as a replacement.



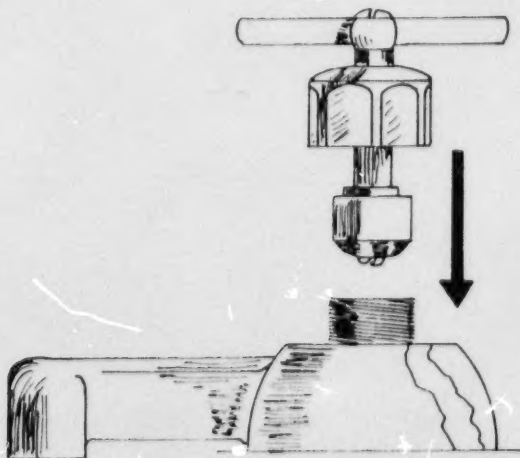
10. Check inside the faucet body for other problems.



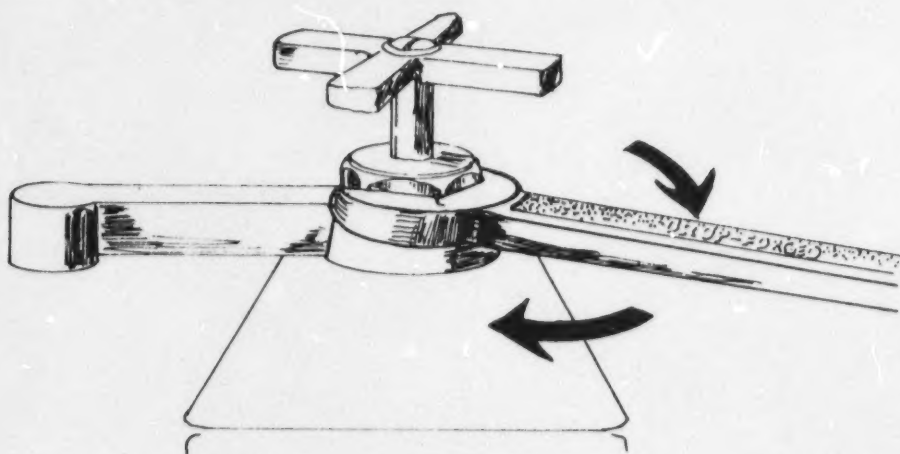
11. Use the seat dressing tool to smooth any roughness from the seat.



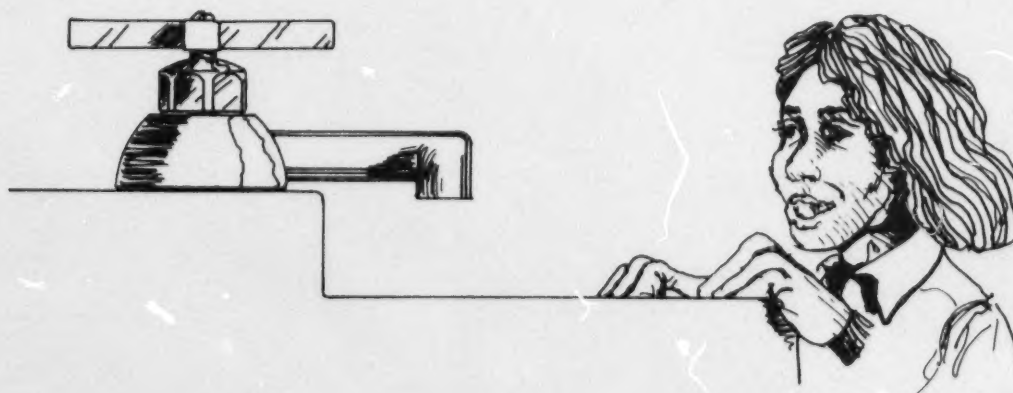
12. Install stem assembly back into faucet body.



13. Tighten the packing nut.



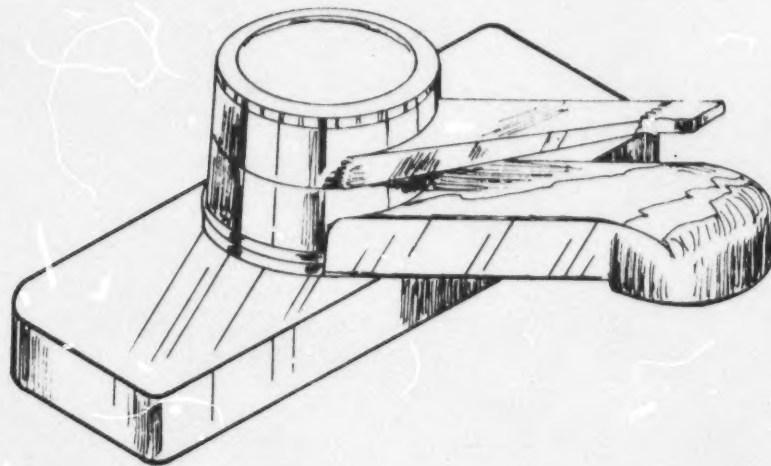
14. Reopen the water supply line to the faucets. Check for leaks or drips.



15. Clean your work area and return tools to their proper places.

TURN TO NEXT PAGE

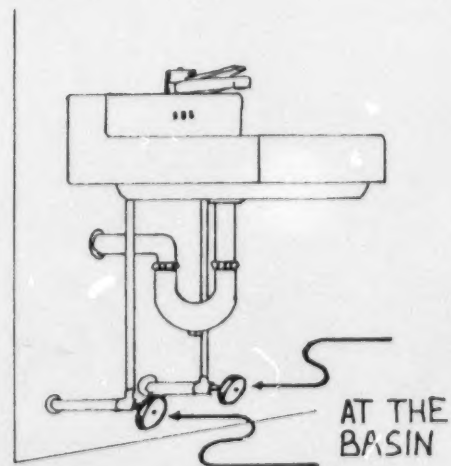
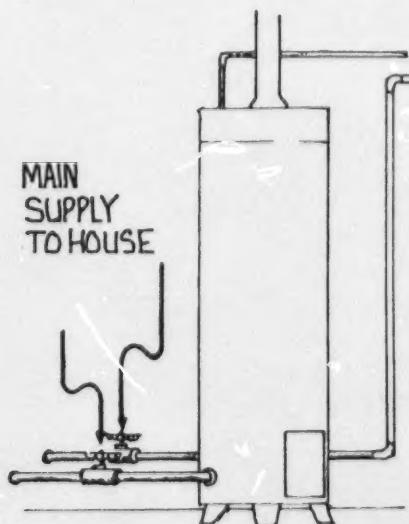
C. Steps for Repairing a Washerless Faucet.



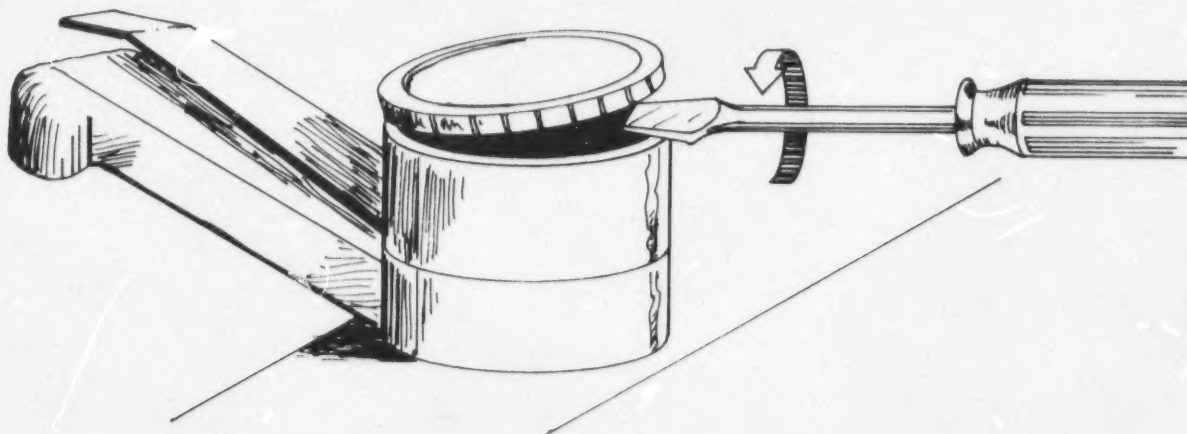
1. Wear proper safety equipment.



2. Shut off water supply line running to the washerless faucet.
Drain the faucet.



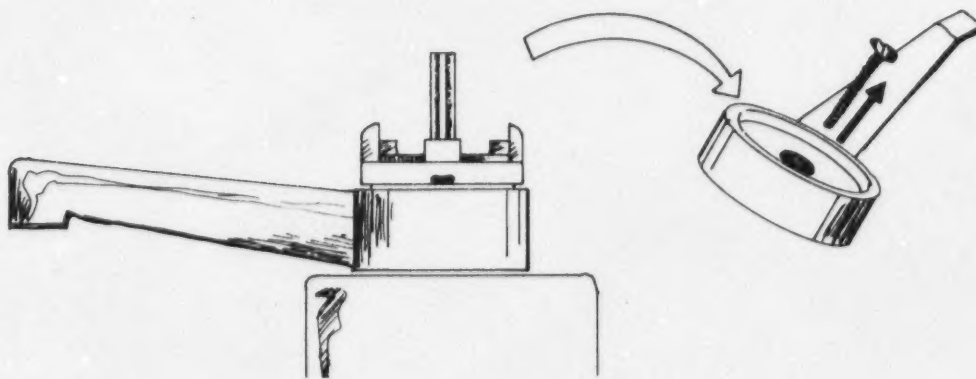
3. Remove the top plate covering from faucet handle.



NOTE!

Keep track of the order in which you remove pieces so you can get it back together correctly.

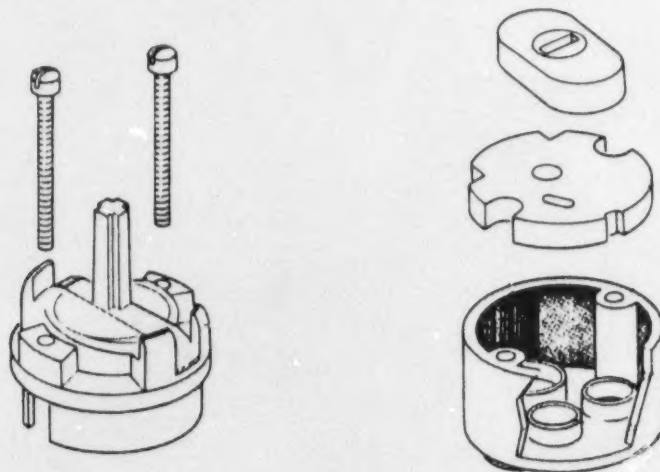
4. Remove the faucet handle to expose the working part.



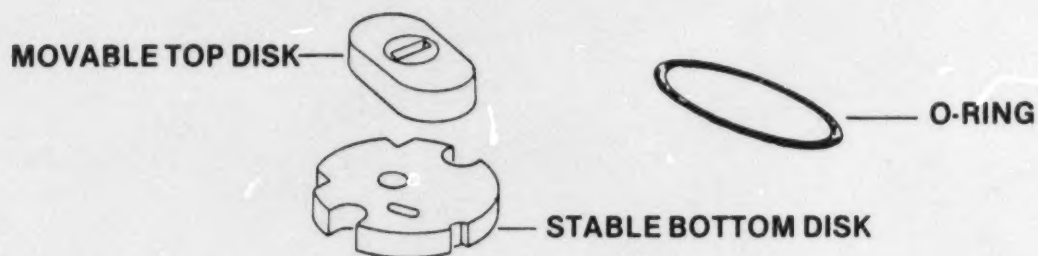
NOTE!

If screws are not exposed, look for an insert to pry out or unscrew the working assembly.

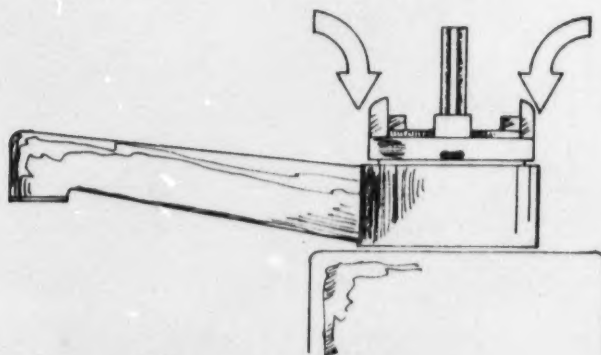
5. Pry out or unscrew the working assembly.



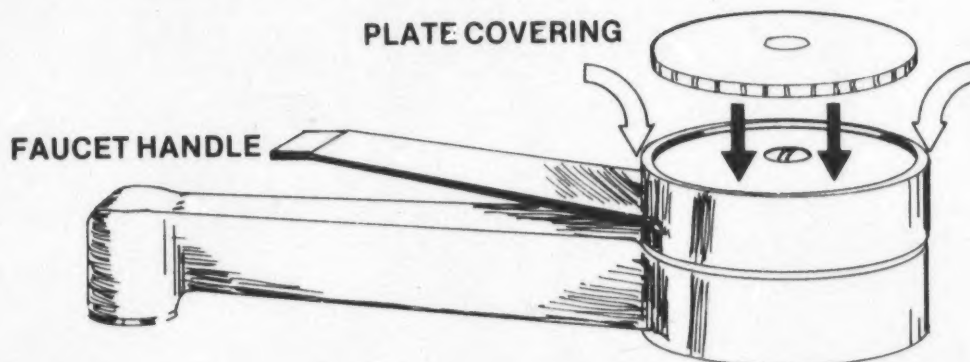
6. Obtain a replacement kit of disks and o-rings (if needed) and replace them.



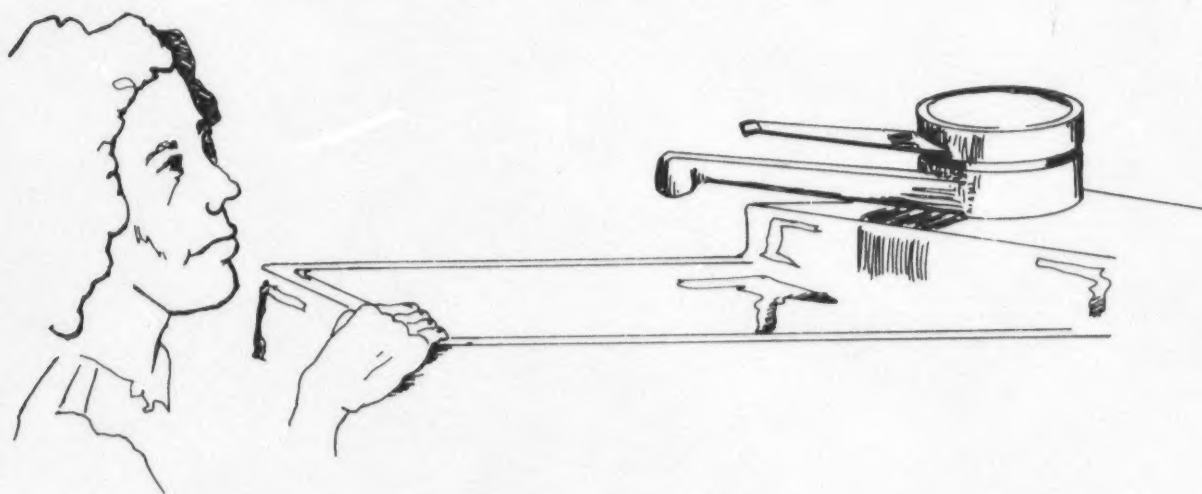
7. Insert working assembly back into faucet body.



8. Replace faucet handle.
Replace top plate covering.



9. Turn on the water supply to the faucet.
10. Turn on faucet handle; allow water to run.
Shut off the handle and check for leaks.



11. Clean work area and return tools.

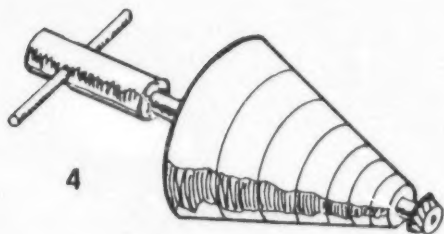
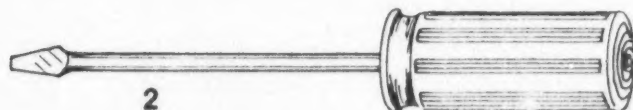
SEE YOUR INSTRUCTOR

Unit 8 Repairing Faucets

Tools and Materials Identification Exercise

Match each object with its correct name.

- ___ A. Standard Screwdriver
- ___ B. Phillips Screwdriver
- ___ C. Seat Dressing Tool
- ___ D. Packing Washers
- ___ E. O-Ring



Unit 8 Repairing Faucets

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified			
a. Standard screwdriver			
b. Phillips screwdriver			
c. Seat dressing tool			
d. Packing washers			
e. O-ring			

Washer-Type Faucet

2.	Wore proper safety equipment.			
3.	Shut off water supply. Drained faucet.			
4.	Loosened packing nut.			
5.	Removed faucet stem.			
6.	Removed washer from bottom of faucet stem.			
7.	Checked rim on stem.			
8.	Filed rim if worn.			
9.	Replaced faucet stem washer.			
10.	Checked inside faucet body for any problems.			
11.	Used seat dressing tool to smooth seat.			
12.	Installed faucet assembly back into faucet.			
13.	Tightened packing nut.			
14.	Turned on water and checked for leaks.			
15.	Cleaned work area, returned tools.			

Washerless Faucet

Tasks	Yes	No	Comments
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1.	Wore protective clothing.			
2.	Shut off water supply.			
3.	Removed top plate covering on faucet.			
4.	Removed faucet handle.			
5.	Removed faucet work assembly.			
6.	Replaced worn assembly parts.			
7.	Inserted assembly back into faucet body.			
8.	Replaced faucet handle on faucet.			
9.	Replaced top plate covering.			
10.	Turned on water supply and checked for leaks.			
11.	Cleaned work area and returned tools.			

Satisfactory Performance ☐

Should Move On ☐

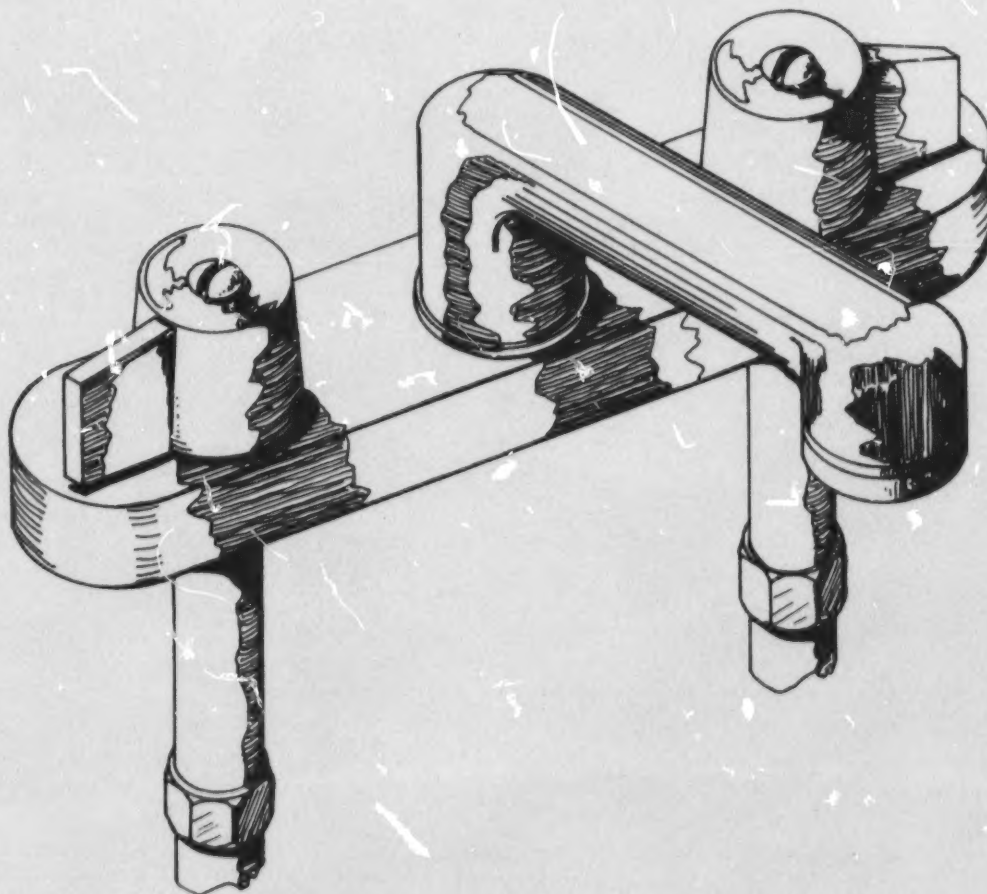
Repeat Exercise ☐

Instructor's Signature

Date

107-2

Vocational Preparation Curriculum
PLUMBING



Unit 9

Replacing a Toilet Bowl

Developed By: Hogan Usoro

Unit 9 Replacing a Toilet Bowl

Replacing a Toilet Bowl

After you have studied this lesson, you should be able to:

1. Identify tools and materials needed to replace a toilet bowl.
2. Remove and install a toilet bowl.

Show What You Can Do

Check the statement that fits you best.

☐

I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.

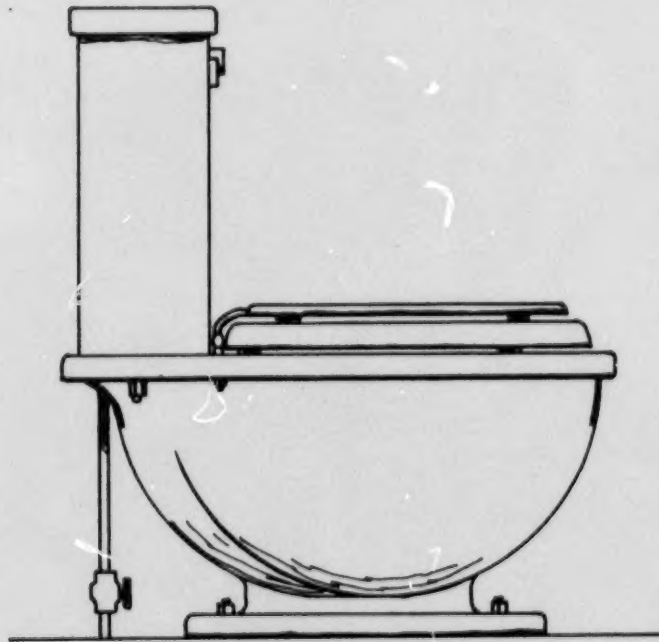


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Unit 9 Replacing a Toilet Bowl

Introduction

As a plumber, you will have to remove worn toilet bowls and install new bowls. This unit will show you the steps of procedure and the tools you will need to complete the job.



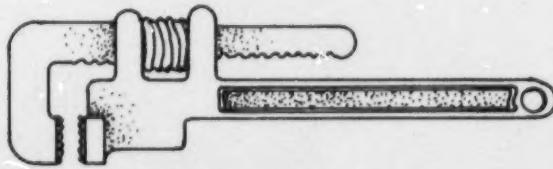
TURN TO NEXT PAGE

Unit 9

Replacing a Toilet Bowl

A. Tools, Materials and Equipment for Replacing a Toilet Bowl.

1. **PIPE WRENCH:** Used for tightening and loosening plumbing pipes.



2. **LEVEL:** Used to check levelness of bowl on floor.



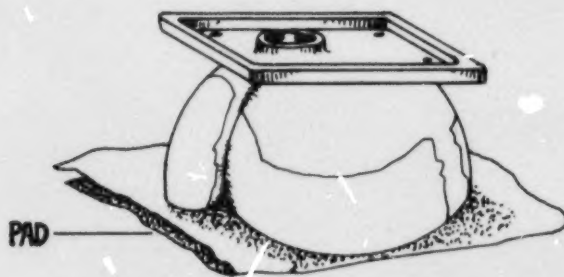
3. **PUTTY KNIFE:** Used to clean old putty from toilet base and floor.



4. **PUTTY:** Used to seal toilet bowl fitting to drain pipe.



5. **PAD:** Used to cushion and protect new toilet bowl. Can be newspaper, blanket or cloth.



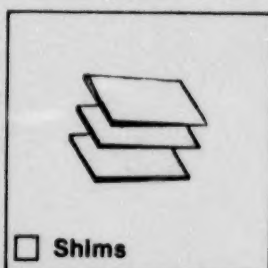
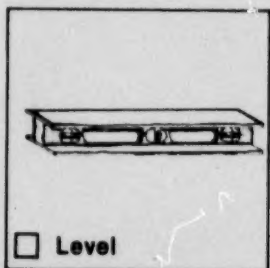
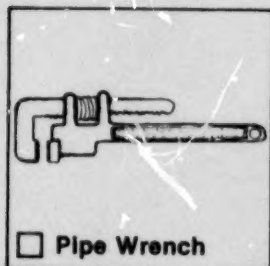
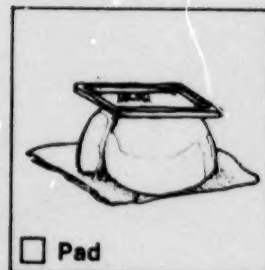
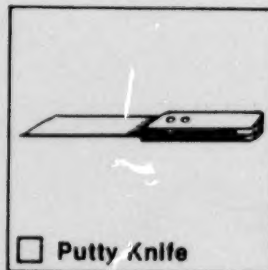
6. **SHIMS:** Used under toilet bowl to level it.



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B. Steps for Replacing a Toilet Bowl.

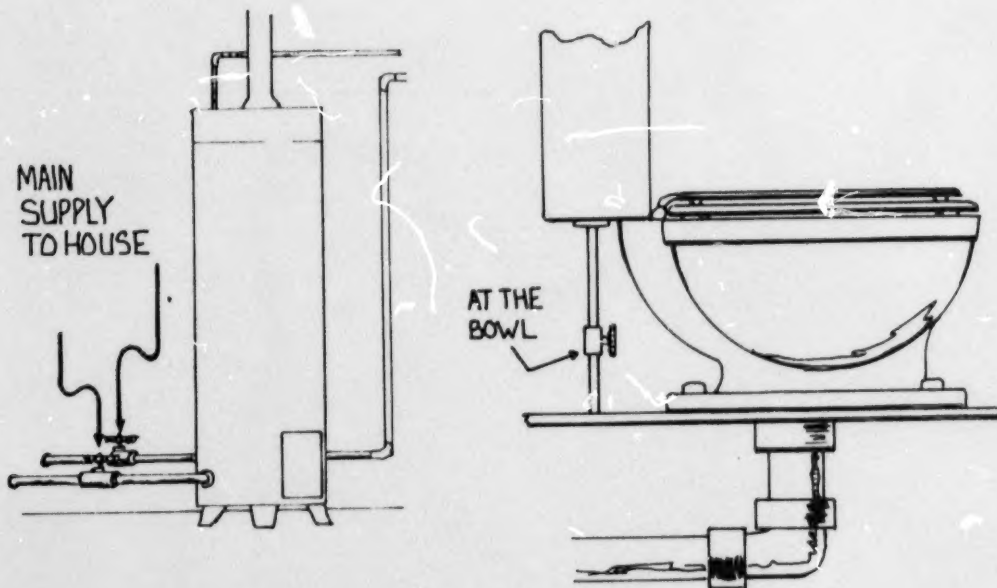
1. Find and Check Off the following:



2. Wear proper safety equipment.



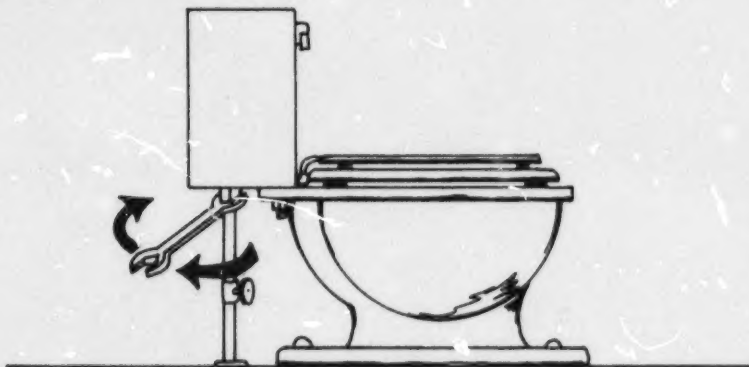
3. Shut off the water supply to the toilet bowl.



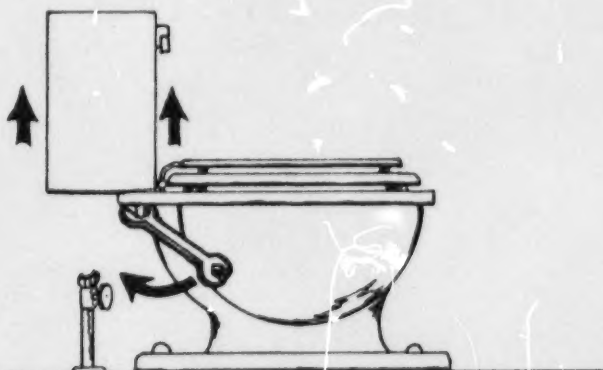
4. Flush the toilet bowl. Bail out all the water from the bowl and tank.



5. Disconnect the water supply line running to tank.



6. Remove bolts holding the tank to the bowl.

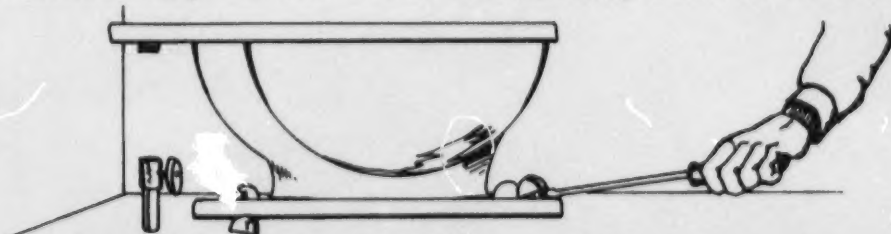


Remove water tank

NOTE!

If the tank is connected to the wall, disconnect it from the bowl first. Then disconnect it from the wall and lift up.

7. Remove cap covers over bolts holding bowl to the floor.



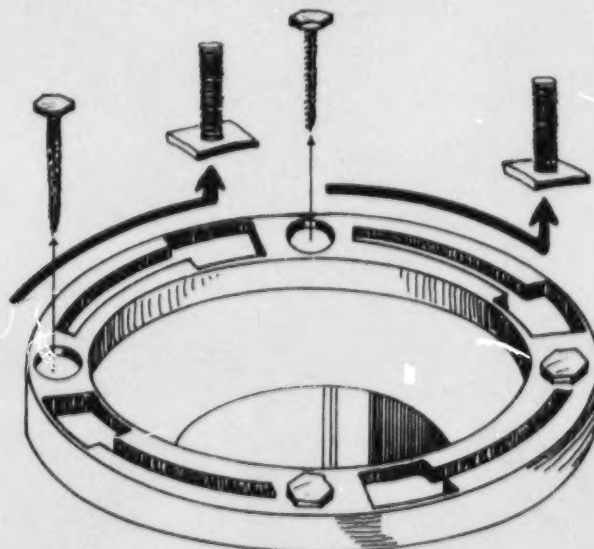
8. Remove the nuts.



9. Lift and twist the bowl from the floor flange.



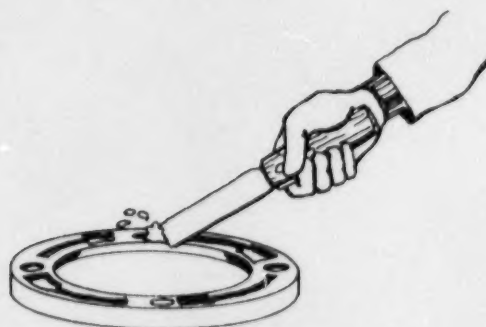
10. Remove bolts from the floor flange around drain opening. Remove front bolts from the floor.



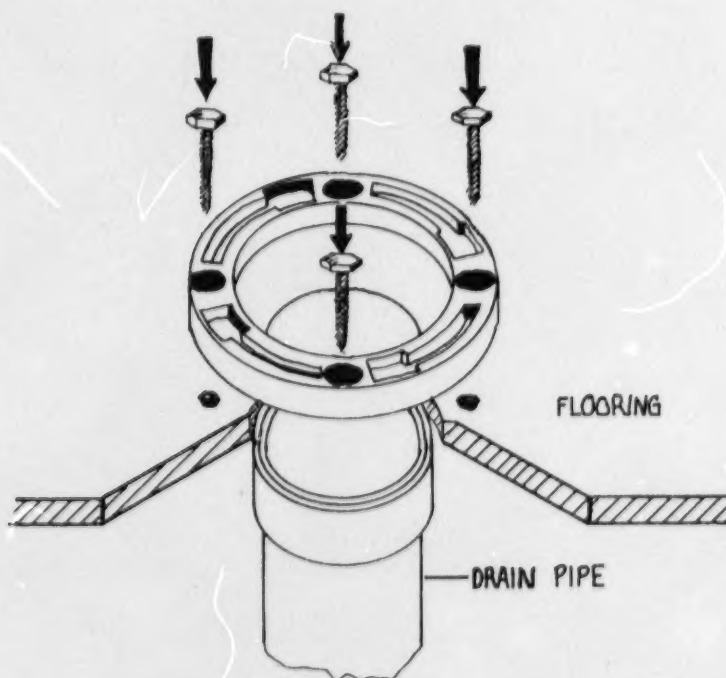
NOTE!

A flange is a collar on a pipe end which gives it support.

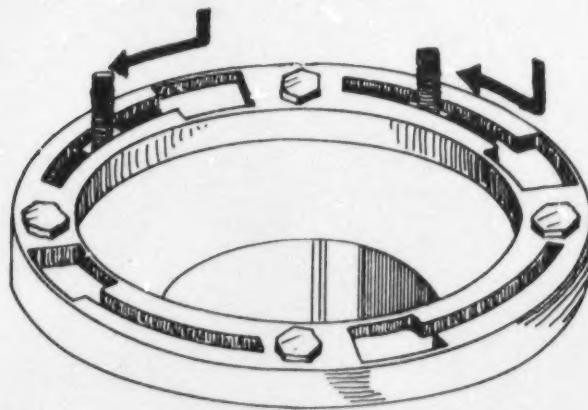
11. Clean the flange if it is to be used again.



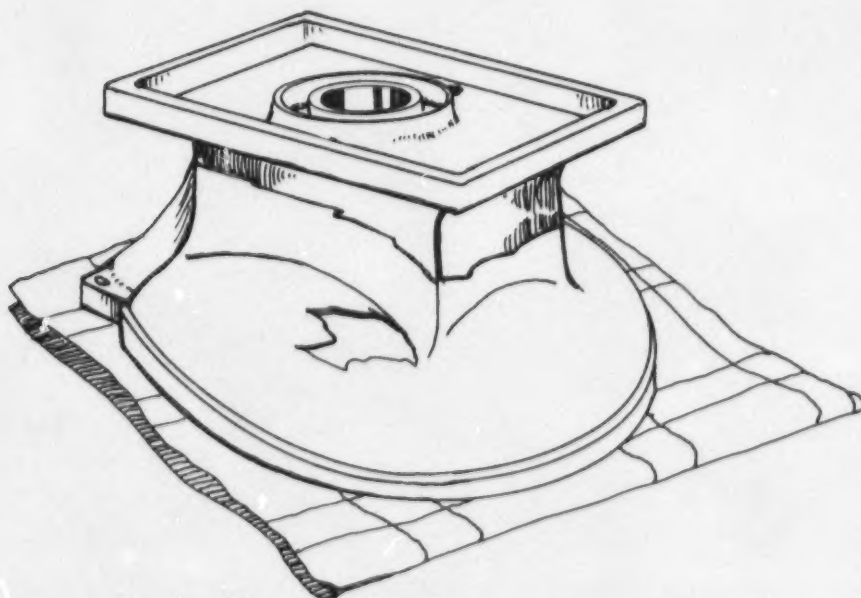
12. Attach a new flange by installing new screw-down bolts in the flange holes.



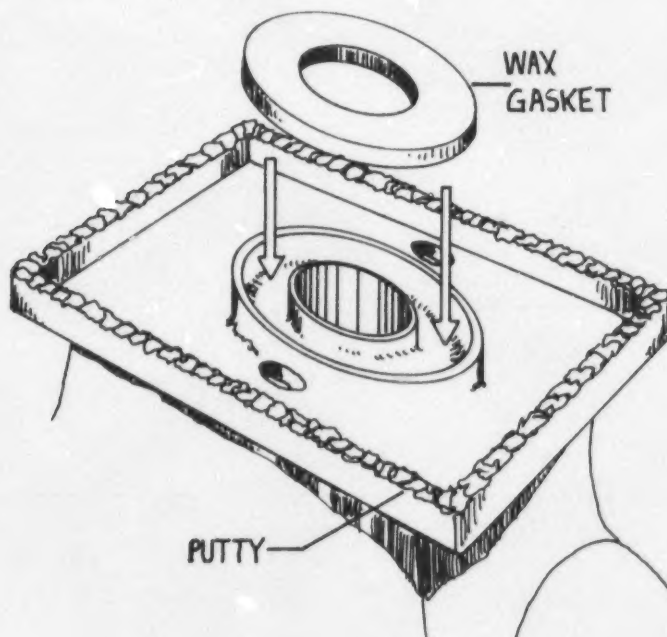
13. Insert hold-down bolts into the flange slots. You will use just two.



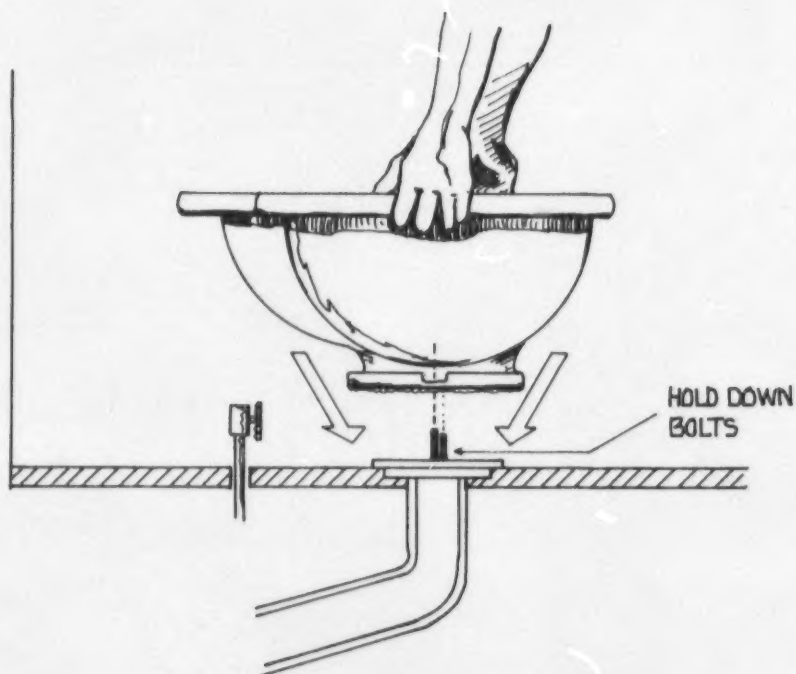
14. Lay pad on floor and set new bowl on it up-side-down.



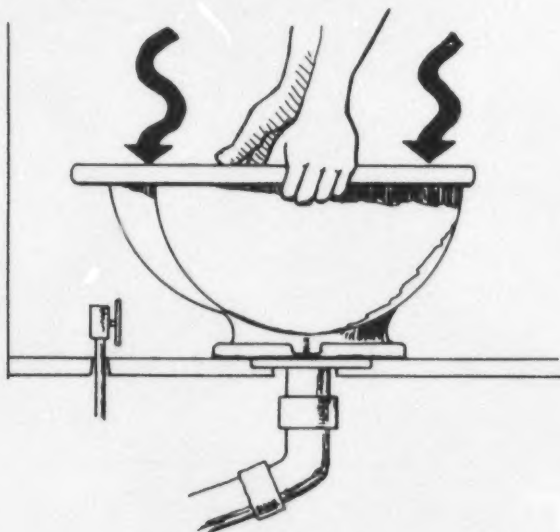
15. Place a new wax gasket around the flange outlet. Apply a bead of putty around bowl bottom.



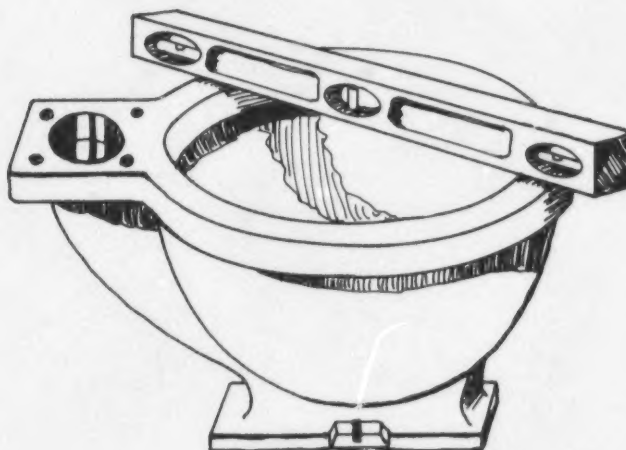
16. Lift the bowl, turn it upright and align it with the hold-down bolts in flange base.



17. Press down on bowl and twist it to seal putty to the floor. Avoid raising bowl once it is in position.



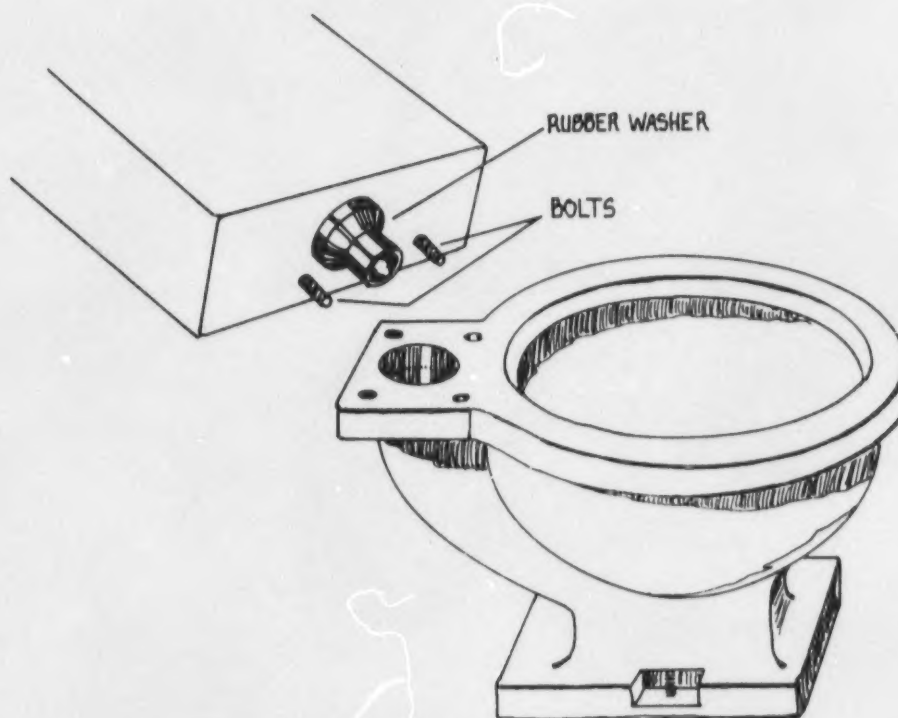
18. Check levelness of the bowl.



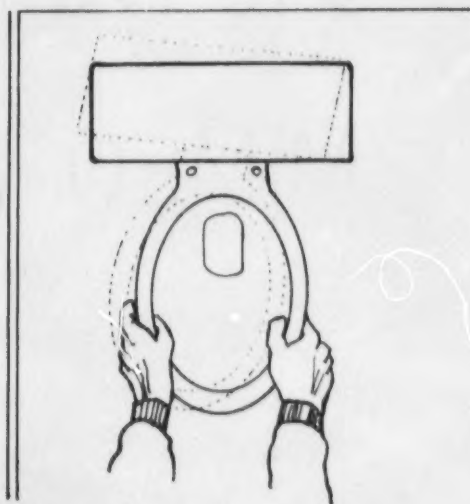
NOTE!

Apply shims between the bowl base and floor if necessary to level the bowl.

19. Set flush tank on the bowl. Make sure the rubber washer and bolts align properly with bowl.



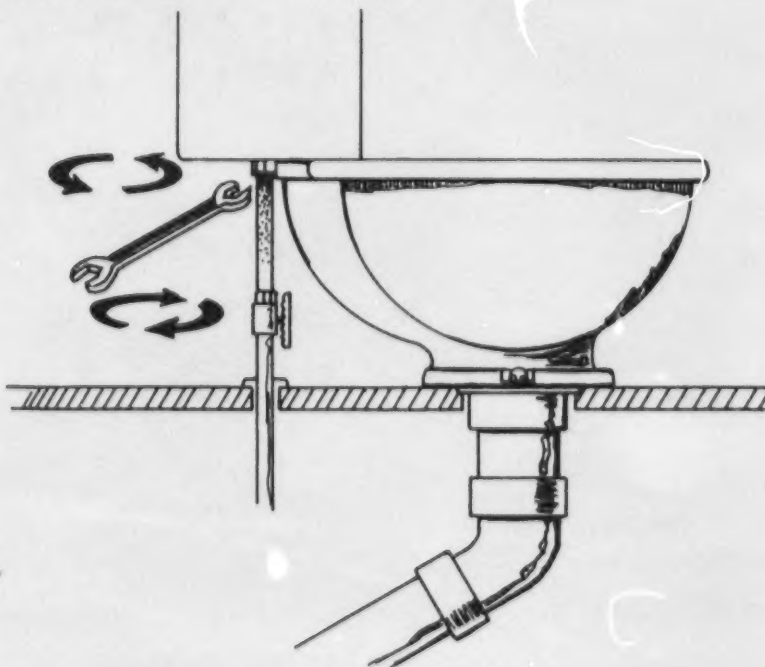
20. Align bowl with wall.



21. Tighten nuts on bowl base. Apply putty inside bolt caps and place them over bolts.



22. Reconnect the water supply line running to tank. Open the water supply line and allow tank to fill.

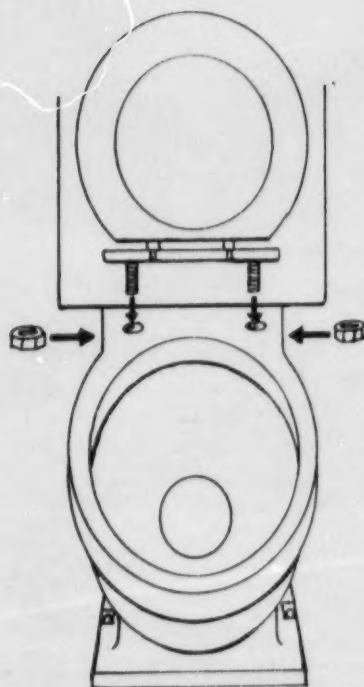


Flush to check for drainage problems or leaks.

23. Check with your instructor if there are any problems.



24. Install a new seat.



25. Return tools to their proper places.

SEE YOUR INSTRUCTOR

Unit 9 Replacing a Toilet Bowl

Tools and Materials Identification Exercise

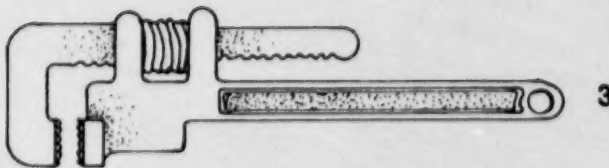
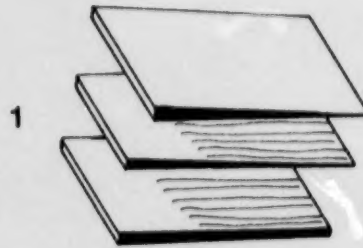
Match each object with its correct name.

___ A. Pipe Wrench

___ B. Level

___ C. Putty Knife

___ D. Shims



Unit 9 Replacing a Toilet Bowl

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified:			
a. Pipe wrench			
b. Level			
c. Putty knife			
d. Putty			
e. Shim			
2. Wore proper safety equipment.			
3. Shut off water supply line and disconnected line from tank.			
4. Flushed and removed all water in bowl and tank.			
5. Removed tank bolts and tank.			
6. Removed bolt cap covers and nuts on bowl base.			
7. Removed bowl by twisting and lifting.			
8. Removed bolts from the floor flange.			
9. Cleaned flange or installed new flange.			
10. Inserted new hold-down bolts in flange.			
11. Correctly placed new bowl on pad.			
12. Placed new wax gasket and putty on bowl base.			
13. Aligned bowl over flange base, pressed and twisted it to seal putty.			

Tasks		Yes	No	Comments
14.	Checked level of bowl.			
15.	Properly attached tank to bowl.			
16.	Aligned bowl with wall.			
17.	Tightened nuts on bowl base.			
18.	Applied putty inside bolt caps and replaced them.			
19.	Reconnected water supply line and opened line.			
20.	Allowed tank to fill and flushed to check installation.			
21.	Correctly installed new seat.			
22.	Returned tools to their proper places.			

Satisfactory Performance ☐

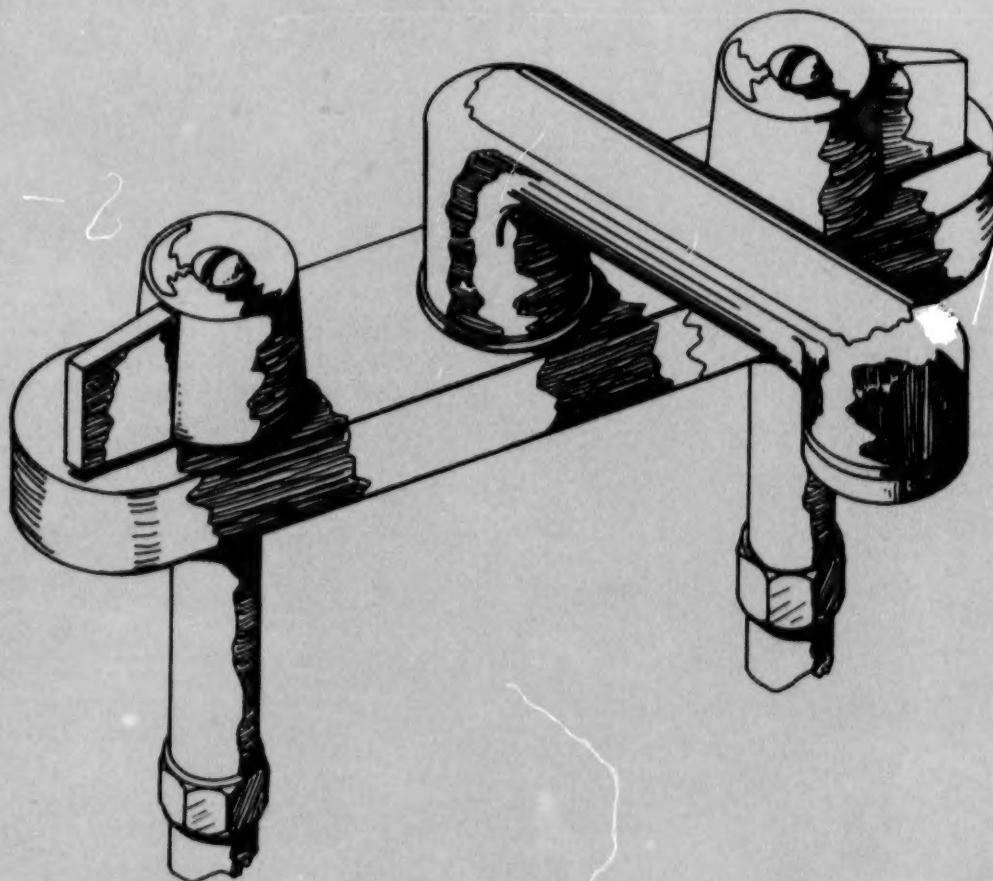
Should Move On ☐

Repeat Exercise ☐

Instructor's Signature

Date

Vocational Preparation Curriculum
PLUMBING



Unit 10

Clearing a Main Drain

Developed By: Hogan Usoro

Unit 10

Clearing a Main Drain

Clearing a Main Drain

After you study this lesson, you should be able to:

1. Identify tools and materials used in clearing a main drain.
2. Clear a main drain.

Show What You Can Do.

Check the statement that fits you best.

☐

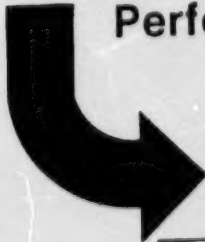
I can do all the tasks above and want my instructor to check me through the Practical Exercise Performance Checklist.



SEE YOUR INSTRUCTOR

☐

I want to study the information in this unit before I do the Practical Exercise Performance Checklist.



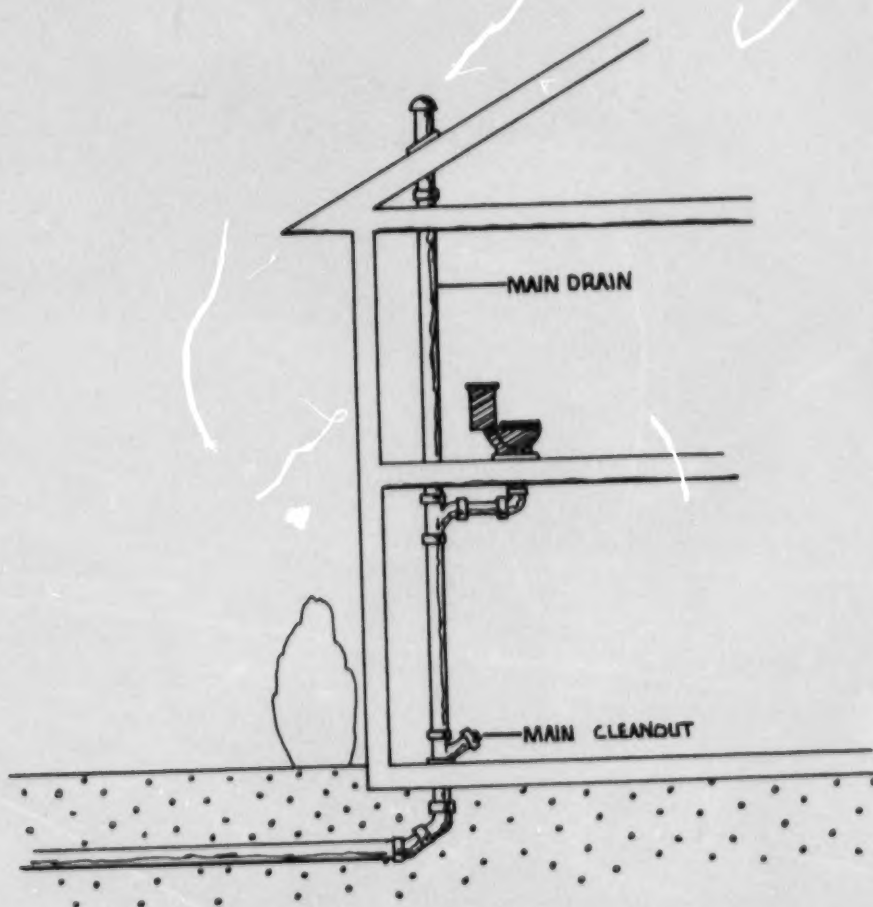
TURN THE PAGE AND BEGIN

Unit 10 Clearing a Main Drain

Introduction

The main drain in a plumbing system is the large vertical pipe or main stem of the plumbing tree. Sometimes the main drain may become blocked with household waste.

In this unit you will learn how to clear a blocked drain.

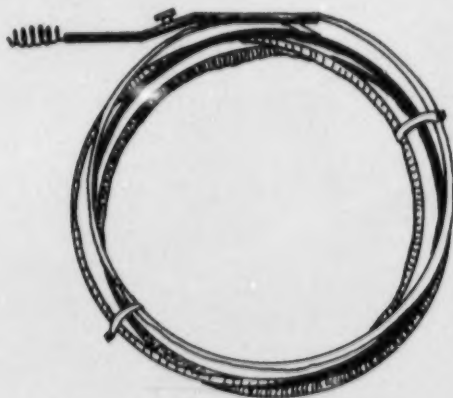


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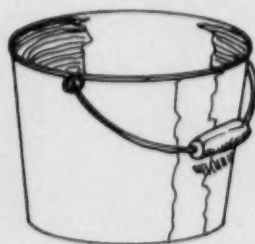
Unit 10 Clearing a Main Drain

A. Tools, Materials and Equipment for Clearing a Main Drain.

1. **TRAP-AND-DRAIN AUGER:** Used to remove clogged waste from drainage pipes.



2. **CONTAINER:** Used to hold waste flowing from pipe.



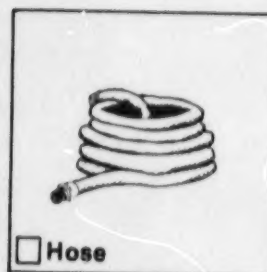
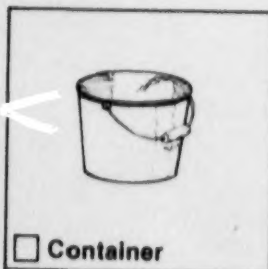
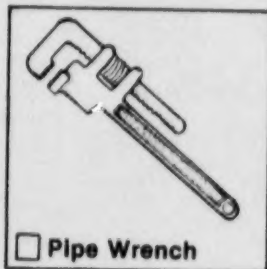
3. **HOSE:** Used to flush out a clogged drain.



TURN TO NEXT PAGE

B. Steps for Clearing a Main Drain.

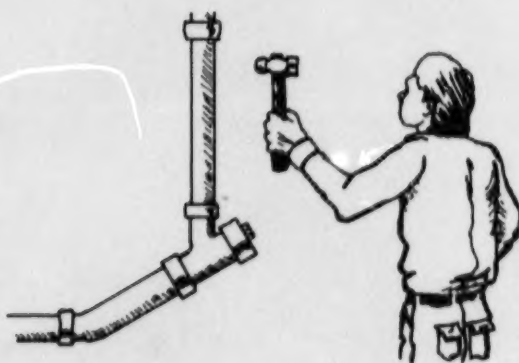
1. Find and Check Off the following:



2. Wear proper safety equipment.



3. Locate the clogged drain pipe section.



NOTE!

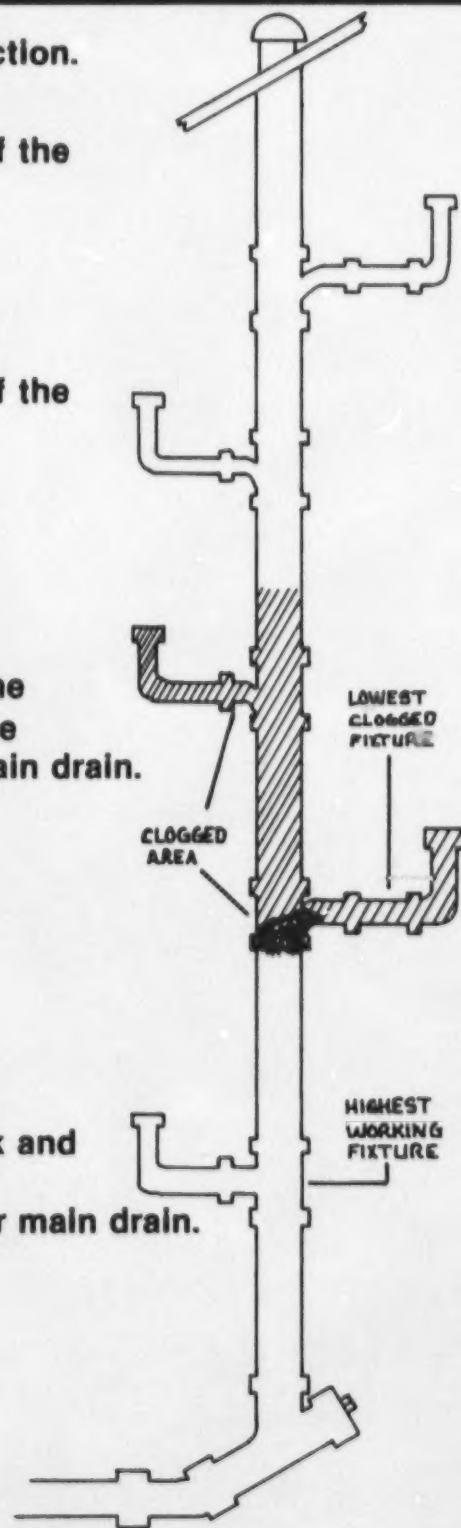
How to Locate a Clogged Pipe Section.

Blockage will be below the level of the lowest clogged fixture.

Blockage will be above the level of the highest working fixture.

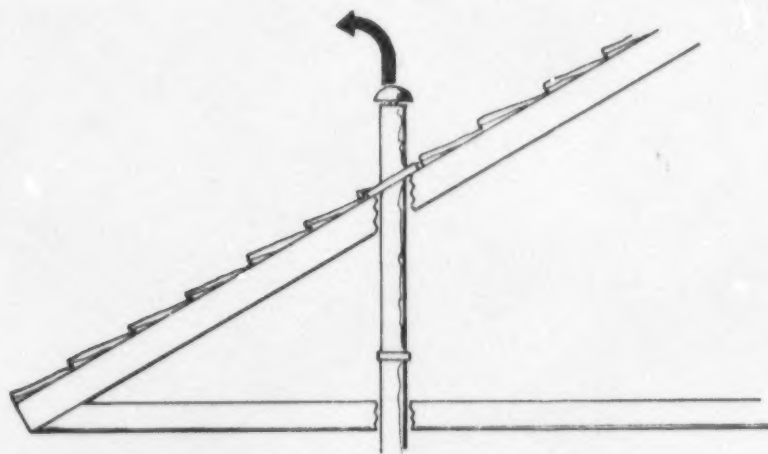
If the top level fixtures clog and the middle and lower fixtures work, the clogged section is in the upper main drain.

If the top and middle fixtures work and the lower fixtures are clogged, the clogged section is in the lower main drain.



If the Upper Main Drain is Clogged:

1. Climb onto the roof and remove cover from vent stack.



2. Insert trap-and-drain auger down the stack and rotate to remove blockage.

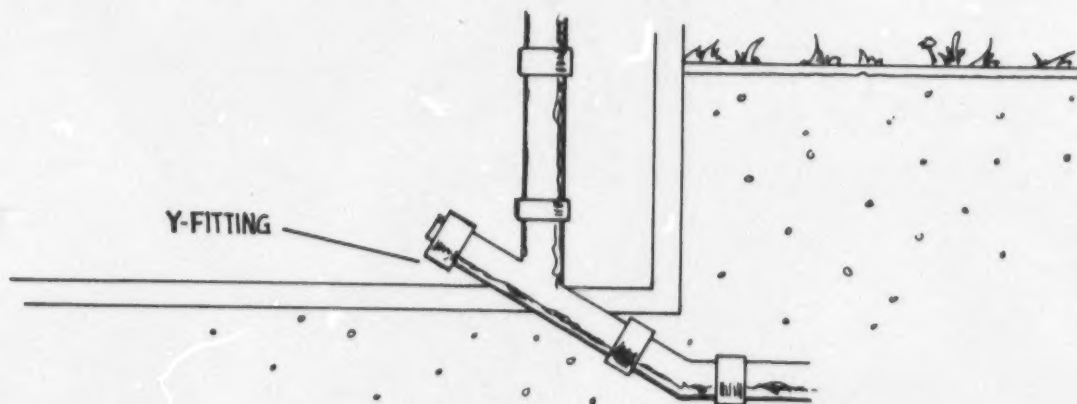


3. Flush the main pipe with water to remove any remaining waste.

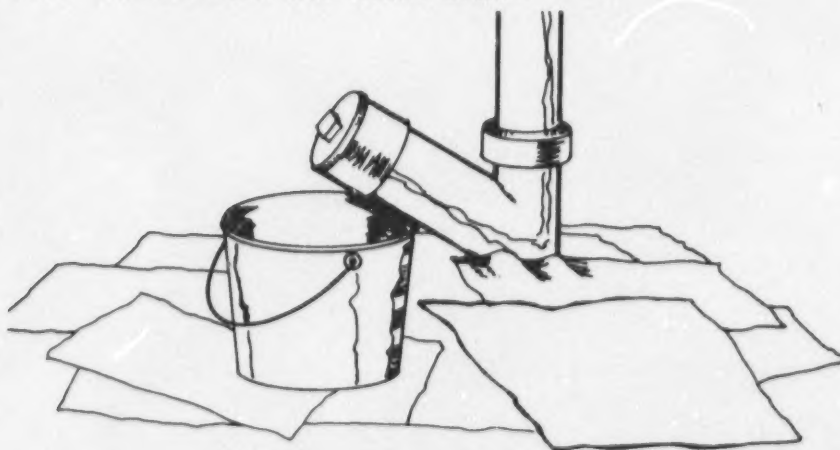


If the Lower Main Drain is Clogged:

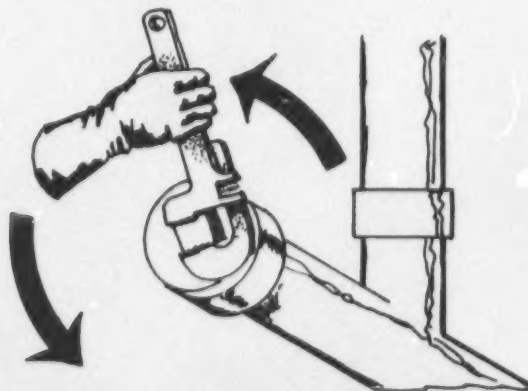
1. Locate Y-fitting near bottom of the main drain.



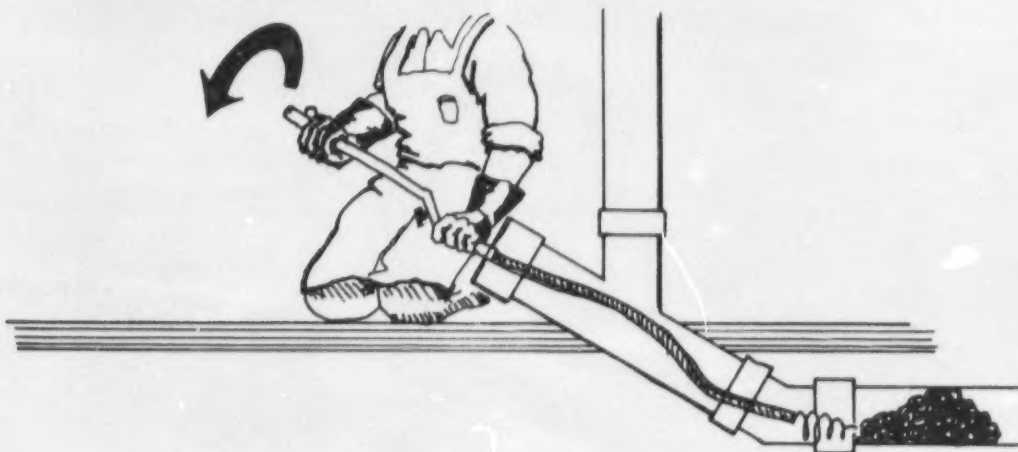
2. Place a container and floor covering under the Y-fitting to catch waste from the main drain.



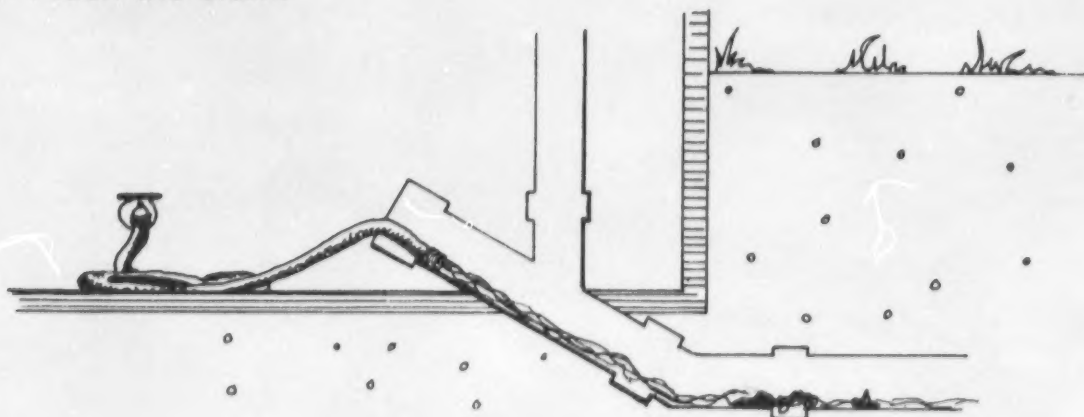
3. Remove the clean-out plug.



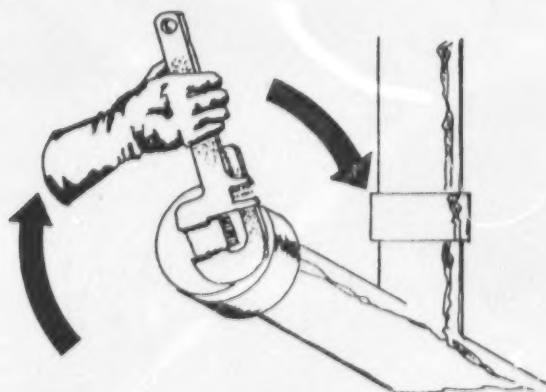
4. Insert the trap-and-drain auger into open Y-fitting and rotate to remove clogged waste.



5. Flush the drain.



6. Screw the clean-out plug back into the Y-fitting.



NOTE!

Apply grease or pipe compound to the threads to prevent rusting and sticking.

7. Mop up all waste and water from the floor. Throw away soaked floor covering. Empty waste from the container.



8. Clean the tools and return them to proper places.

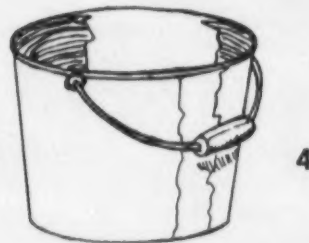
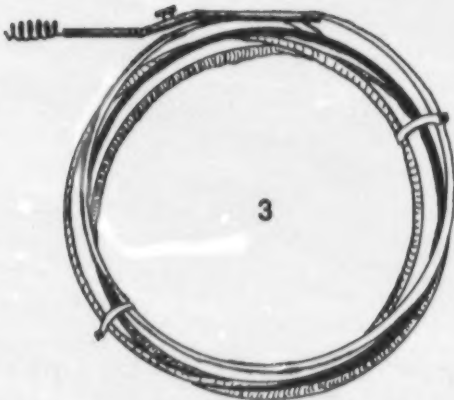
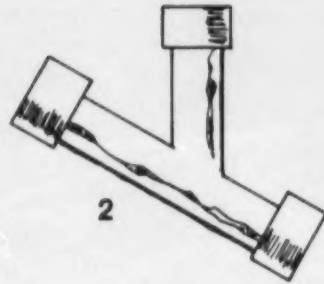
SEE YOUR INSTRUCTOR

Unit 10 Clearing a Main Drain

Tools and Materials Identification Exercise

Match each object with its correct name.

- ___ A. Trap-and-Drain Auger
- ___ B. Container
- ___ C. Garden Hose
- ___ D. Y-Fitting



Unit 10

Clearing a Main Drain

Practical Exercise Performance Checklist

The student _____ successfully performed the following tasks:

Tasks	Yes	No	Comments
1. Identified			
a. Trap-and-Drain auger			
b. Container			
c. Garden hose			
2. Wore proper safety equipment.			
3. Located the clogged drain pipe section.			
4. Climbed onto roof and removed vent stack cover.			
5. Inserted auger into stack and removed blockage.			
6. Flushed main drain out with a hose.			
or			
7. Located Y-Fitting near bottom of main drain.			
8. Placed waste container and floor covering by Y-fitting.			
9. Removed the clean-out plug.			
10. Inserted auger into Y-fitting and removed blockage.			
11. Flushed out the drain.			
12. Screwed back the clean-out plug.			
13. Mopped up waste and water from floor.			
14. Cleaned tools and returned to proper places.			

Satisfactory Performance ☐

Should Move On ☐

Repeat Exercise ☐

Instructor's Signature

Date